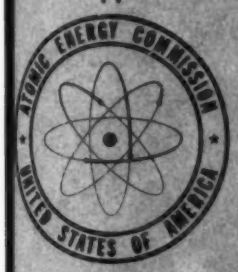
UNITED STATES ATOMIC ENERGY COMMISSION

UNIVERSITY
OF MICHIGAN
OCT 2 1956
ENGINEERING
LIBRARY

Nuclear Science Abstracts

Volume 10 No. 16 Supplement
Abstracts 6096 - 6454
August 31, 1956



Technical Information Service Extension, Oak Ridge, Tenn.

SPECIAL NOTICE

The U. S. Atomic Energy Commission has reviewed its classified reports on an accelerated basis to release the maximum amount of information possible to the national nuclear energy program. Older reports declassified in this review program are being announced in supplements to regularly scheduled issues of *Nuclear Science Abstracts*. Current unclassified AEC reports are announced routinely in the semimonthly issues of *Nuclear Science Abstracts*.

Abstracts in these supplementary issues are numbered consecutively with those in the regular issues of *Nuclear Science Abstracts* to facilitate uniform bibliographic control. The abstracts are indexed by author in each issue. Subject indexing will appear in the semiannual and annual issues of the current volume of *Nuclear Science Abstracts*. Each issue also includes a Numerical Index of Reports for the reports abstracted in the issue. This index provides availability information for each report abstracted. The semiannual and annual issues of this volume will provide complete coverage for all reports abstracted in the supplementary issues.

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission to the extent that such employee or contractor prepares, handles or distributes, or provides access to, any information pursuant to his employment or contract with the Commission.

NUCLEAR SCIENCE ABSTRACTS

Volume 10 August 31, 1956 No. 16 Suppl.

BIOLOGY AND MEDICINE

AEROSOLS

6096 ORNL-1352
Oak Ridge National Lab., Tenn.
PROTECTIVE EQUIPMENT EVALUATION PROGRAM QUARTERLY PROGRESS REPORT FOR JULY 1, 1951 TO SEPTEMBER 30, 1951. Aug. 6, 1952. Decl. Jan. 13, 1956. 45p. Contract W-7405-eng-26. $7.80(ph OTS); $3.30(mf OTS).

Preliminary data are reported on the following: design of a monodisperse solid aerosol generator; techniques of forming, measuring, controlling and handling small particle aerosols; particle separation in smoke using electrostatic precipitators; design of an electrostatic precipitator; and diffusion constants and analytic methods for determining SO_3 and NH_3. (T.W.S.)

6097 UCRL-2345(Suppl.)
California. Univ., Berkeley. Radiation Lab.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] MAY, JUNE, AND JULY 1953. AEROSOL STUDIES. J. G. Hamilton and Patricia Wallace. Sept. 21, 1953. Decl. Jan. 13, 1956. 6p. Contract W-7405-eng-48. $1.80(ph OTS); $1.80(mf OTS).

Preliminary work is reported in a study of the fate of radioactive aerosol particles having a size range from 1 to 5μ following intratracheal injection in monkeys. Methods for preparing and injecting Pu oxide are described, and data are tabulated on fecal and urinary excretion following intratracheal injection. (C.H.)

RADIATION EFFECTS

6098 M-1091
California. Univ., Berkeley. Radiation Lab.
METABOLISM OF FISSION PRODUCTS: $Te^{127, 129}$. Progress Report for Period Ending August 15, 1944. Joseph G. Hamilton. Sept. 2, 1944. Decl. Feb. 14, 1956. 20p. $3.30(ph OTS); $2.40(mf OTS).

The preparation of a $Te^{127,129}$ source is described in detail. The tellurium was administered orally, intramuscularly, and through the lung to 36 rats weighing from 200 to 300 gm, and their tissues were sampled. It was concluded that Te is absorbed by way of the digestive tract, that the rates of elimination of absorbed Te by oral and intramuscular administration are rapid and essentially comparable, and that the principle organs of deposition for absorbed Te are blood, liver, and kidney. (B.J.H.)

RADIATION HAZARDS AND PROTECTION

6099 K-375
Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.
RADIATION DOSAGE FROM CHAIN REACTIONS. M. C. Edlund and S. Visner. Mar. 23, 1949. Decl. Feb. 8, 1956. 23p. $4.80(ph OTS); $2.70(mf OTS).

In order to evaluate the health hazard that may be associated with an inadvertent chain reaction of U in the K-25 Plant, a quantitative estimate of the radiation dosage resulting from the neutron and γ radiation released by a reaction has been made. Formulae are developed for the radiation dosage in terms of the power level and the utilization of a pile. (auth)

TOXICOLOGY STUDIES

6100 K-596
Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.
TESTS OF THE M-11 ASSALT MASK CANISTER IN ATMOSPHERES CONTAINING URANIUM HEXAFLUORIDE, FLUORINE, HYDROGEN FLUORIDE, DECAFLUOROBIS (TRIFLUOROMETHYL) CYCLOHEXANE AND PARTIALLY PYROLYZED DECAFLUOROBIS (TRIFLUOROMETHYL) CYCLOHEXANE. E. B. Olszewski, C. L. Stewart, D. L. Stoddard, and J. H. Bull. May 10, 1950. Decl. Dec. 27, 1955. 26p. Contract [W-7405-eng-26]. $0.25(OTS).

6101 MLM-381
Mound Lab., Miamisburg, Ohio.
BIOLOGICAL RESEARCH QUARTERLY REPORT FOR JULY, AUGUST, SEPTEMBER 1949. Oct. 1, 1949. Decl. Jan. 10, 1956. 73p. Contract AT-33-1-Gen-53. $12.30 (ph OTS); $4.50(mf OTS).

Progress is reported in the following studies: the tissue distribution of Po in laboratory animals; the effect of different levels of Po on colony-producing organisms in sewage; hematological and pathological effects of Po on rats; and the development of techniques for the assay of biological materials for Po. (C.H.)

6102 MLM-442
Mound Lab., Miamisburg, Ohio.
BIOLOGICAL RESEARCH QUARTERLY REPORT FOR JANUARY, FEBRUARY, MARCH 1950. Apr. 1, 1950. Decl. Jan. 10, 1956. 82p. Contract AT-33-1-GEN-53. $13.80(ph OTS); $4.80(mf OTS).

Progress is reported in the following studies: the tissue distribution of injected Po in rats; the effects of intravenous Po injections of 8.9, 19.7, and 29.5 μc upon the estrus cycle of adult rats; the effects of Po upon growth, respiration, and cell division of yeast cells; and pathological effects of α particles from injected Po in rats. (C.H.)

6103 UCLA-345
California. Univ. Los Angeles. Atomic Energy Project.
QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 30, 1955. Oct. 10, 1955. Decl. Jan. 13, 1956. 113p. Contract AT-04-1-Gen-12. $16.80(ph OTS); $5.40(mf OTS).

Progress is reported on the following studies: the effects of radiation on proteins of blood sera from rats and humans; the extraction of ribonucleic acid from yeast; the effects of x irradiation on the metabolism of fatty acids in rats; the synthesis of fatty acids; the effect of zymosan on survival time in irradiated mice; the development of test procedures for the evaluation of the phagocytic function of the reticulo-endothelial system; the development of procedures for the measurement of kidney function by external

γ-ray scintillation counting following the intravenous injection of Diodrast; the development of chemical dosimeters; tracer studies on the bone deposition of Ca and Sr in rabbits; the preparation of an antibiotic-like agent from a lactobacillus isolated from the rat's small intestine; the late pathological effects of x radiation in rats; routine health physics activities; the infrared spectra of polybrominated fatty acids; the improvement of techniques for electron microscopy; the performance of semi-solid agar-aqueous dye chemical systems in determinations of integrated high-range depth dose values directly in a tissue-equivalent medium, and factors affecting the uptake of fission products by plants. (C.H.)

CHEMISTRY

6104 AECD-3775

[Oak Ridge National Lab., Y-12 Area, Tenn.]

MEASUREMENTS OF THE VISCOSITY OF FLINAK (11.5 Mol % NaF, 42 Mol % KF, AND 46.5 Mol % LiF). M. Tobias. Feb. 26, 1952. Decl. with deletions Nov. 28, 1955. 9p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

The viscosity of the NaF–KF–LiF system under consideration varied from 8 cp at 550°C to 3 cp at 800°C. (K.S.)

6105 AECD-3838

Oak Ridge National Lab., Y-12 Area, Tenn.

CLARITY OF BORATED WATER. H. P. House and C. D. Susano. Mar. 5, 1952. Decl. with deletions Dec. 6, 1955. 10p. Contract W-7405-Eng-26. $0.15(OTS).

The proposal was made to carry out the disassembly of equipment under an aqueous solution of boron salts in order to protect personnel from radiation hazards. For this purpose, experiments were made to find a boron salt solution which contains 1% of B by weight and which will retain its clarity so that observations can be made at a depth of 20 ft. (B.J.H.)

6106 AECD-4054

Carbide and Carbon Cehmicals Corp. [Y-12 Plant], Oak Ridge, Tenn.

HYDROFLUORINATION OF ZIRCONIUM OXIDE. Don Phillips. Aug. 2, 1950. Decl. Jan. 13, 1956. 5p. Contract [W-7405-eng-26]. (Y-B33-33). $1.80(ph OTS); $1.80(mf OTS).

6107 K-111

Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.

THE FLUOROTHENE MANUFACTURING PLANT. B. A. Kress, C. C. Littlefield, P. J. Marlino, J. L. Sinquefield, and R. M. Vail. Dec. 17, 1947. Decl. Feb. 8, 1956. 61p. $10.80(ph OTS); $3.90(mf OTS).

The design of a plant for the production of fluorothene at the rate of 5,000 pounds per month is presented. Included are a description of all parts of the plant, cost figures for construction and operation, a description of process and its utilities, and complete information concerning the laboratory for preparation and analyses of the polymerization promoter. (auth)

6108 LA-1523

Los Alamos Scientific Lab., N. Mex.

THE PREPARATION AND REDUCTION OF POLONIUM DIOXIDE. Final Report on Project Authorization CMR-3-8. George Moulton, John Farr, and Dwayne Vier. Mar. 1953. Decl. Dec. 13, 1955. 14p. Contract W-7405-eng-36. $0.15 (OTS).

The preparation and reduction of polonium dioxide, PoO_2, is described. The light yellow-orange colored dioxide is formed by the reaction of Po and dry O_2 at a temperature of 250°C and an O_2 pressure of 40 mm of Hg. Hydrogen at a pressure of 40 mm of Hg quantitatively reduces the oxide to the metal at a temperature of 200°C. (auth)

6109 M-4123

Monsanto Chemical Co., Dayton, Ohio.

THE PREPARATION AND PROPERTIES OF THE CHLORIDES OF POLONIUM. Information Meeting Paper No. 5. E. Francis Joy. Aug. 11, 1947. Decl. Dec. 6, 1955. 37p. $0.25 (OTS).

Pure crystalline $PoCl_4$ was prepared by heating PoO_2 with vapors of CCl_4 at 200°C or by the reaction of Cl on PoO_2 at 200°C. Geometrical and optical properties of the yellow crystals have been partly determined. Hydrolyzation takes place in moist air to form needles. The melting point is over 355°C. $PoCl_2$, a red crystalline solid, was prepared by Cl reaction on Po at 125°C, dissociation of $PoCl_4$ at 260°C in a vacuum and $PoCl_4$ reduction by H. From x-ray data, the crystals are found to be orthorhombic with a unit cell with $a_0 = 4.331$, $b_0 = 8.94_4$ and $c_0 = 7.29_2$. (F.S.)

6110 M-4164

Clinton Labs., Oak Ridge, Tenn.

STABILITY OF PLASTIC GASKETING MATERIALS IN CRUD REMOVAL SOLUTIONS. W. B. Howerton. Aug. 11, 1947. Decl. Jan. 12, 1956. 6p. $1.80(ph OTS); $1.80(mf OTS).

Polythene and teflon withstood the physical testing better than any of the samples and were relatively unaffected by the treatment. The other samples tested were amber koroseal, black koroseal, neoprene and silastic 150. In the tests to determine contamination and decontamination, little difference was noted between the samples tested. Decontamination factors of 10 or less were obtained for all except neoprene that was decomposed before the test was completed and silastic 150 that gave a factor near 100 but was softened by the treatment. (auth)

6111 NAA-SR-1087

North American Aviation, Inc., Downey, Calif.

GENERAL CHEMISTRY QUARTERLY PROGRESS REPORT [FOR] APRIL–JUNE 1954. Eugene L. Colichman, ed. Dec. 15, 1954. Decl. Jan. 12, 1956. 22p. Contract AT-11-1-gen-8. $3.30(ph OTS); $2.40(mf OTS).

The thermal and radiation stabilities of 1-Mev electron, fast neutron, and γ irradiated o- and m-terphenyls from 30 to 475°C were investigated. The development of an infrared method for analysis of polyphenyls is discussed. The performance of a loop for circulating organic fluids up to 900°F is reported. Techniques and apparatus for producing high-purity ZrH_2, are given. The flame photometric determinations of In in oxy-hydrogen and air-hydrogen flames, B in boric acid solution in oxy-acetylene, oxy-hydrogen, and air-hydrogen flames, and traces of Na in KCl in oxy-acetyleneflames is discussed and results are given. (J.E.D.)

6112 TID-5241

[National Bureau of Standards, Washington, D. C.]

BORON. M. S. Richmond and R. E. Telford. [1946?]. TIS issurance date Nov. 1954. Decl. Jan. 13, 1956. 18p. $0.20(OTS).

Literature on the chemical determination of B is surveyed. (B.J.H.)

6113 UCRL-923

California. Univ., Berkeley. Radiation Lab.

CHEMISTRY DIVISION QUARTERLY REPORT [FOR] JUNE, JULY, AND AUGUST 1950. Sept. 25, 1950. Decl.

Jan. 13, 1956. 81p. Contract W-7405-eng-48. $12.30 (ph OTS); $4.50(mf OTS).

Progress is reported in the following research areas: chemistry of rare earth and actinide elements; nuclear properties and transformations; synthetic and experimental chemistry; biological chemistry; photosynthesis chemistry; metals and high-temperature thermodynamics; and basic chemistry, including metal chelates. (C.W.H.)

6114 UCRL-1365
California. Univ., Berkeley. Radiation Lab.
CHEMISTRY DIVISION QUARTERLY REPORT FOR MARCH, APRIL, AND MAY 1951. June 26, 1951. Decl. Jan. 12, 1956. 49p. Contract W-7405-eng-48. $7.80 (ph OTS); $3.30(mf OTS).

6115 UCRL-1632
California. Univ., Berkeley. Radiation Lab.
CHEMISTRY DIVISION QUARTERLY REPORT [FOR] SEPTEMBER, OCTOBER, AND NOVEMBER 1951. Jan. 28, 1952. Decl. Jan. 13, 1956. 56p. Contract W-7405-eng-48. $9.30(ph OTS); $3.60(mf OTS).

6116 UCRL-1770
California. Univ., Berkeley. Radiation Lab.
CHEMISTRY DIVISION QUARTERLY REPORT [FOR] DECEMBER 1951, JANUARY, FEBRUARY 1952. April 21, 1952. Decl. Jan. 16, 1956. 54p. Contract W-7405-Eng-48. $9.30(ph OTS); $3.60(mf OTS).

Chemistry of the Rare Earth and Actinide Elements. Calibration of a microcalorimeter and design of an ozonizer are described briefly. Nuclear Properties and Transformations. Results of studies on α decay of Am^{243}; fission and spallation of Ag, Bi, and Ta by 340-Mev protons; decay schemes of Cd^{105}, Ni^{56}, Pa^{232}, Am^{241}, U^{237}, Np^{237}, U^{238}, and Pu^{239}; radiation effects on alcohols; mass spectrometry; and use of tri-α-naphthyl-bismuthine for Szilard-Chalmers concentration of Bi^{210m} are summarized. Bioorganic Chemistry. Tracer studies of the mechanisms of uracil oxidation with $KMnO_4$, decomposition of bis(hydroxymethyl) peroxide, and the Leukart reaction for synthesis of amines; syntheses of cholic-23-C^{14} acid, valeric-3-C^{14} acid, methyl-C^{14} iodide, isobutyl bromide, 4-hydroxyproline-5-C^{14}, norleucine-3-C^{14}, cholestenone-t, and various intermediates; and development of laboratory facilities for washing highly radioactive glassware, for organic synthesis, and for preparation of gaseous samples of C^{14} and T_2 for counting are reported. Investigations of the effect of γ radiation on aqueous glycine, effect of drugs on metabolism of CH_3COONa-2-C^{14} in the rat, valeric-1-C^{14} acid metabolism in mouse-liver slices, paper chromatography of steroids and squalene, cholesterol metabolism in rats, and metabolism of morphine-N-methyl-C^{14} in humans are summarized. Photosynthesis Chemistry. Studies of dark fixation of CO_2 by Euglena gracilis, effect of anti-folics on photosynthesis, and chromatography of phosphate esters and erythronic acid are reported. Metals and High-Temperature Thermodynamics. Brief statements of progress on gaseous hydroxides, reactions of borides, oxidation states of In, crystalline form of precipitated CeF_4, electron exchange rate between Fe^{2+} and Fe^{3+}, and hydrolytic polymerization of Zr^{4+} are presented. (G.Y.)

6117 UCRL-1878
California. Univ., Berkeley. Radiation Lab.
CHEMISTRY DIVISION QUARTERLY REPORT [FOR] MARCH, APRIL, AND MAY 1952. July 2, 1952. Decl. Jan. 12, 1956. Contract W-7405-eng-48. $10.80(ph OTS); $3.90(mf OTS).

6118 Y-764
Oak Ridge National Lab., Y-12 Area, Tenn.
PREPARATION OF HIGHLY PURIFIED ZIRCONIUM OXIDE. C. D. Susano and H. P. House. May 18, 1951. Decl. Jan. 6, 1956. 31p. Contract W-7405-eng-26. $0.25(OTS).

A number of purification methods, including volatilization, dialysis, ion exchange and precipitation, were tested in order to determine their effectiveness in removing low concentrations of impurities from Zr compounds. The objective was to produce a quantity of ZrO_2 of such purity that it could be used as standard material in spectrographic analysis. Of the methods tested, the most satisfactory, and, in fact, the only method that yielded a product approaching the desired purity, consisted of a 5-stage recrystallization process in which $ZrOCl_2$ was crystallized from 8.7M HCl solutions. Using this procedure, approximately 2.5 pounds of ZrO_2 of the requisite purity was made available for use as spectrographic standard material. A spectrographic examination of this product revealed that all impurities were below the limits that could be evaluated by spectrographic techniques except Fe, Si, and Cu and that in no case was the concentration of any of these three impurities in excess of 10 ppm. (auth)

6119 Y-769
Oak Ridge National Lab., Y-12 Area, Tenn.
PREPARATION OF ZIRCONIUM TETRAFLUORIDE. Progress Report No. II. Joe L. Williams. Feb. 15, 1951. Decl. Jan. 27, 1956. 13p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

Studies on the preparation of ZrF_4 by hydrofluorination of the oxide, followed by vacuum sublimation, have been considerably extended since publication of the preceding progress report. Reaction rates have been determined and equipment design has been improved. Some properties of the high quality product are discussed. (auth)

ANALYTICAL PROCEDURES

6120 AECD-4019
National Bureau of Standards, Washington, D. C.
TENTATIVE PROCEDURES FOR THE ANALYSIS OF BERYLLIUM METAL AND OXIDE. George J. Petretic, comp. [1947]. Decl. Jan. 12, 1956. 58p. (NBS-C-100; A-2949). $10.80(ph OTS); $3.90(mf OTS).

As a result of a conference held at the NBS, a program was initiated to compile a set of procedures for the analysis of Be. The purpose was to adopt a standard procedure for an element in an effort to obtain more reliable determinations of the constituents and a better agreement between laboratories. Procedures have been selected on the basis of results obtained on the analysis of standard samples. Procedures for determining Si, Ca, Mg, Al, B, Cd, C, Cl, Cr, Cu, F, Fe, Pb, Mn, Ni, N, and H_2O are outlined. (D.E.B.)

6121 AECD-4062
Oak Ridge National Lab., [Y-12 Area], Tenn.
STATISTICAL QUALITY CONTROL [REPORT FOR] DECEMBER 1951 THROUGH FEBRUARY 1952. C. D. Susano and R. L. McCutchen. Apr. 4, 1952. Decl. Jan. 16, 1956. 26p. Contract W-7405-eng-26. (Y-B31-344). $4.80(ph OTS); $2.70(mf OTS).

Data are presented covering statistical quality control of analyses made over a three-month period in the HR, General Ionic, and X-10 laboratories. (T.W.S.)

6122 AECD-4090
Tennessee Eastman Corp., Oak Ridge, Tenn.
A NEW PROCEDURE FOR THE COLORIMETRIC DETERMINATION OF TELLURIUM. D. M. Gruen, B. S. Weaver, and J. W. Gates, Jr. Nov. 5, 1945. Decl. Jan. 27, 1956. 7p. Contract W-7401-eng-23. (C-1.360.9). $1.80(ph OTS); $1.80(mf OTS).

A rapid colorimetric method for the determination of

traces of Te depending upon the color of a colloidal suspension of the metal has been developed. It is accurate to 2 to 3%. Only those ions interfere which form insoluble chlorides or which are reduced to the elemental state by stannous chloride. The time required for a complete analysis is 10 to 15 min. (auth)

6123 AECD-4124
Tennessee Eastman Corp., Oak Ridge, Tenn.
COLORIMETRIC DETERMINATION OF TRACE AMOUNTS OF VANADIUM IN TUBALLOY COMPOUNDS. R. W. Woodard, Boyd S. Weaver, and J. W. Gates, Jr. Sept. 22, 1945. Decl. Jan. 30, 1956. 9p. Contract W-7401-eng-23. (C-1.360.5). $1.80(ph OTS); $1.80(mf OTS).

A suitable method for determining trace quantities of V in U compounds depends on the red color formed when V oxyquinolate is complexed with ethyl alcohol and extracted with chloroform. An accuracy of 95% was found in a range of 20 to 100 μg V and all U may be reclaimed. (F.S.)

6124 AECD-4081
Tennessee Eastman Corp., Oak Ridge, Tenn.
EQUATIONS USED FOR CALCULATION OF DATA BY THE FEEDBACK METHOD. G. P. Happ and A. E. Cameron. Oct. 26, 1945. Decl. Jan. 18, 1956. 6p. (B-6.460.6). $1.80(ph OTS); $1.80(mf OTS).

An equation is derived which is useful in calculating results of mass spectrographic isotopic analysis of UF_6 samples. (T.W.S.)

6125 HW-25206
Hanford Works, Richland, Wash.
ANALYTICAL PROCEDURES FOR THE PLUTONIUM METAL FABRICATION PROCESS. VIII. THE CARRIER CONCENTRATION METHOD. L. F. Kendall. Aug. 15, 1952. Decl. Dec. 7, 1955. 17p. Contract W-31-109-Eng-52. $0.20(OTS).

The carrier concentration method takes advantage of the difference in volatilities of the matrix oxide and of the impurity oxides. The more refractory matrix (in this case, plutonium oxide) is not volatilized appreciably during the exposure, while most of the impurities are carried into the arc stream by means of the gallium oxide carrier. Details of the procedure are included. A comparison of results obtained by this method with those obtained by the cupferron extraction-copper spark method revealed that large discrepancies existed for some elements. (auth)

6126 K-835
Carbide and Carbon Chemicals Co. K-25 Plant, Oak Ridge, Tenn.
THE SPECTROCHEMICAL ASSAY OF URANIUM 235 USING PHOTOMULTIPLIER TUBES. T. Lee and Lewis H. Rogers. Oct. 31, 1951. Decl. Jan. 5, 1956. 28p. Contract W-7405-eng-26. $0.25(OTS).

A Jarrell-Ash 21-ft-grating spectrograph was adapted to direct reading by replacing the photographic plateholder with exit slits and photomultiplier tubes. Using a hollow cathode discharge tube for excitation of the sample and the isotopic shift effect, U^{235} was determined in several samples by comparison with a single standard. The U^{235} content of the samples and standards was known from mass-spectrometer measurements to within 0.5% of the amount present at the 95% confidence level. For a determination consisting of 10 measurements, the precision obtained was from plus or minus 1.2 to 1.8% of the amount present over a concentration range of from 8% to 11.9% U^{235}. (auth)

6127 KAPL-332
Knolls Atomic Power Lab., Schenectady, N. Y.
THE DETERMINATION OF RADIOZIRCONIUM BY TTA. Mary E. Brennan and John F. Flagg. Apr. 19, 1950. Decl. Jan. 10, 1956. 18p. Contract W-31-109-Eng-52. $3.30 (ph OTS); $2.40(mf OTS).

The method discussed for the determination of fission product Zr is based on the fact that under favorable conditions TTA (thenoyltrifluoracetone) forms a stable chelate with Zr(IV) which is soluble in benzene. The method involves the use of a two-phase system, an aqueous acidic phase containing a non-complexing anion and the Zr to be analyzed, and a benzene phase containing the chelating agent, TTA. (auth)

6128 KAPL-472
Knolls Atomic Power Lab., Schenectady, N. Y.
THE DETERMINATION OF TRACE AMOUNTS OF HYDROGEN IN HELIUM. H. C. Mattraw. Jan. 31, 1951. Decl. Dec. 6, 1955. 22p. Contract W-31-109-Eng-52. $0.20(OTS).

Either H_2 or tritium in the range 1 to 0.001% in He may be determined by sorption on powdered U metal at room temperature, followed by heating of the U bed to evolve the sorbed gas. The development of the method is summarized, the apparatus is sketched, and the preparation of the U bed is discussed. (G.Y.)

6129 LA-1285
Los Alamos Scientific Lab., N. Mex.
THE DETERMINATION OF VANADIUM IN THE PRESENCE OF PLUTONIUM. Maynard E. Smith. Aug. 1, 1951. Decl. Dec. 9, 1955. 26p. Contract W-7405-eng-36. $0.25(OTS).

A polarographic method for the determination of V in the presence of Pu has been devised which does not require a separation of the Pu. Hydrochloric acid solutions containing both Pu and V are treated with Zn and Zn amalgam prior to analysis in order to reduce both metals. The Pu is reduced to the (III) state and the V chiefly to the (II) state. The height of the anodic wave produced by the oxidation of the V is proportional to the total V concentration. Plutonium(III) does not produce an interfering wave. Solutions of V/Pu weight ratio as low as 6.4×10^{-4} may be analyzed by this method with a reproducibility of 3.4% for the 95% level. (auth)

6130 LA-1897
Los Alamos Scientific Lab., N. Mex.
THE SPECTROPHOTOMETRIC DETERMINATION OF THORIUM IN URANIUM. Maynard E. Smith. Apr. 1955. Decl. Dec. 9, 1955. 16p. Contract W-7405-eng-36. $0.20(OTS).

A method is reported for the determination of Th in U in quantities ranging from 50 to 300 ppm. It involves the separation of the U from the Th by complexing the Th with Versene and precipitating the uranium as the peroxide. The precipitate is removed by filtration and Versene in the filtrate is destroyed by heating with nitric and perchloric acids. A spectrophotometric determination of the thorium in the filtrate is then made using thorin as the color-forming reagent. The standard deviation calculated from 36 determinations was approximately 6 ppm over the above range. (auth)

6131 N-1536pn
[Chicago. Univ. Metallurgical Lab.]
THE QUANTITATIVE DETERMINATION OF PLUTONIUM IN BIOLOGICAL MATERIALS. PART III. THE ANALYSIS OF TISSUES. Edwin R. Russell. June 12, 1946. Decl. Jan. 10, 1956. 19p. Contract [W-7401-eng-37]. (MUC-HG-1218). $3.30(ph OTS); $2.40(mf OTS).

Three methods described by which tissues may be ashed for analysis for Pu include wet ashing with nitric acid and hydrogen peroxide; a combination nitric acid wet ashing and dry ashing procedure; and a dry ashing procedure. Each procedure is described in connection with the Pu extraction procedure applied. Five general methods are described for extracting Pu from solutions of high salt content. The

solvent extraction procedures, cupferron-chloroform, hexone and TTA, all make use of a preliminary precipitation procedure. The Zr phosphate and $BiPO_4$ precipitation extraction procedures are adopted directly to the tissue ash solution. All the analytical methods described with the exception of the TTA method are dependent upon a final precipitation of Pu with La fluoride. (auth)

6132 NAA-SR-912

North American Aviation, Inc., Downey, Calif.

CHEMICAL DEVELOPMENT QUARTERLY PROGRESS REPORT [FOR] OCTOBER–DECEMBER 1953. R. L. Loftness, ed. Feb. 23, 1954. Decl. Jan. 10, 1956. 21p. Contract AT-11-1-GEN-8. $3.30(ph OTS); $2.40(mf OTS).

Equipment was fabricated and tested for the study of the radiation and thermal stability of terphenyl, biphenyl, and polyphenyl. Preliminary results are given for the pyrolysis of terphenyl. ZrH_2 appears to have thermal and radiation stability. Biphenyl can be determined in polyphenyls by a water solubility method. A flame photometric method was developed for the determination of Cd in the presence of Al, Cu, and Fe. (T.W.S.)

6133 NYOO-2001

New Brunswick Lab., AEC, N. J. and National Bureau of Standards, Washington, D. C.

THE DETERMINATION OF BORON IN ZIRCONIUM. Jessie Craig and Martha S. Richmond. Aug. 1949. Decl. Jan. 13, 1956. 14p. $3.30(ph OTS); $2.40(mf OTS).

A procedure for the determination of B in Zr is described in the report. Included are detailed descriptions of reagents and apparatus and the results obtained from analysis of various samples of Zr. The work which was done on ZrO_2 is also given. (auth)

6134 ORNL-1521

Oak Ridge National Lab., Tenn.

SPECTROPHOTOMETRIC DETERMINATION OF LITHIUM. P. F. Thomason. May 6, 1953. Decl. Dec. 19, 1955. 25p. Contract W-7405-eng-26. $4.80(ph OTS); $2.70(mf OTS).

A spectrophotometric method for determining microgram amounts of lithium has been developed that uses 1-(o-arsonophenylazo)-2-naphthol-3, 6-disulfonic acid (Thoron) as the chromogenic reagent in an alkaline solution of water and acetone. Calcium and magnesium cause little interference when present in amounts less than ten times the amount of lithium. Sodium can be tolerated in amounts up to fifty times the amount of lithium. Potassium does not interfere; in fact, a potassium hydroxide solution is used as one of the reagents in the procedure. The results of the analysis of lithium chloride solutions have shown that the accuracy of the method is of the order of ±3%. (auth)

6135 SEP-22

Sylvania Electric Products Inc., Bayside, N. Y.

THE DETERMINATION OF HYDROGEN IN URANIUM AND ZIRCONIUM BY COMBUSTION METHODS. C. C. Gregg, W. S. Wartel, and Bernard Kopelman. July 13, 1949. Decl. Dec. 6, 1955. 14p. Contract [AT-30-1-Gen-366]. $0.20 (OTS).

The determination of H in U and Zr by combustion in dry air using a vertical furnace maintained for 2 hrs at 500°C for U and 16 hrs at 1000° for Zr eliminates the need for microchemical analysis. Samples of 15 to 20g regardless of surface area are applicable for analysis. Hydrogen in Zr may be determined by ignition at 1200°C for 15 min in O_2 in a modified carbon train. (F.S.)

6136 Y-465

Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.

PROCEDURES FOR RAW MATERIAL ANALYSIS AT Y-12. W. R. Grimes and G. H. Clewett. Aug. 9, 1949. Decl. Dec. 6, 1955. 28p. Contract W-7405-Eng-26. $0.25(OTS).

Three procedures are described, one volumetric, one colorimetric, and one fluorescence, which have been developed at Y-12 and applied there to raw materials analysis, but which have not been generally adopted elsewhere. While no claim that these procedures are generally superior to those in common use is intended, it is pointed out that in some special cases, these methods are definitely to be preferred. (auth)

Refer also to abstract 6229.

DEUTERIUM AND DEUTERIUM COMPOUNDS

6137 AECD-4085

Du Pont de Nemours (E. I.) & Co. Engineering Dept., Wilmington, Del.

DISTRIBUTION COEFFICIENT OF D_2O BETWEEN TRIETHYLAMINE AND WATER. H. C. Carlson. Aug. 31, 1943. Decl. Jan. 30, 1956. 3p. (2XR-85). $1.80(ph OTS); $1.80(mf OTS).

Water-d_2 was not preferentially concentrated by a triethylamine extraction of enriched water. (C.W.H.)

6138 CC-1606

[Chicago. Univ.] Metallurgical Lab.

CHEMICAL RESEARCH–HEAVY WATER; REPORT FOR MONTH ENDING MAY 1, 1944. May 16, 1944. Decl. Feb. 2, 1956. 22p. Contract [W-7401-eng-37]. (A-2267). $4.80(ph OTS); $2.70(mf OTS).

The specific gravity of 100% D_2O at 25.00°C is 1.10777 ± 0.00002. This value is based on pycnometric and complete isotopic analyses of 7 samples of D_2O ranging from 99.65 to 99.95 mol % D. The D content of D_2O samples were determined to ± 0.02% by pycnometric methods combined with the value above for 100% D_2O and the measured O^{18} content of the sample. The recovery of the D_2O from the UO_2F_2 solutions to be used in the homogeneous exponential experiment will be carried out in two steps: (1) rapid recovery of about 75% of the D_2O by distillation at one atmosphere pressure until the initial (~1.3 molar) solution is concentrated to 4.5 to 5.0 molar; (2) recovery of the remaining D_2O by multiple shallow tray drying. The solubility of uranyl fluoride in water at 25.0 and 99.9°C is 67.3 and 73% by weight, respectively. The efficiency of a Pt charcoal catalyst for recombination of $H_2 - O_2$ mixtures in excess helium has been measured in order to determine its suitability in the gas recirculating system of the heterogeneous heavy water pile. Over 95% efficiency in the temperature range 25 to 100°C was observed under conditions more exacting than anticipated during operation of the pile. A memorandum has been issued and investigation is concluded. Changes in plasticity, settling rates, and particle sizes of uranium trioxide monohydrate slurry during the second Chicago centrifugal pump run have been measured. Plasticity parameters of the slurry and the average surface per unit volume of solid decreased with increasing pumping time. Settling rates increased. The data have a favorable bearing on the overall slurry pile problem. (auth)

6139 CC-1915

Chicago. Univ. Metallurgical Lab.

CHEMICAL RESEARCH–ANALYTICAL REPORT FOR MONTH ENDING JULY 1, 1944. Aug. 11, 1944. Decl. Jan. 30, 1956. 15p. (A-2803). $3.30(ph OTS); $2.40(mf OTS).

Resolution curves on HD and D_2 for gases of different composition as measured on two spectrometers indicate that for gases of very low protium content each ion requires a slightly different ion potential. Analyses of duplicate samples on different instruments check within the over-all pre-

cision usually ascribed to spectrometers over extended periods. (auth)

FLUORINE AND FLUORINE COMPOUNDS

6140 A-4013
Harshaw Chemical Co., Cleveland.
CONSTRUCTION, INSTALLATION AND OPERATION OF HARSHAW FLUORINE CELL. H. D. Williams, G. C. Whitaker, and K. E. Long. Nov. 20, 1944. Decl. Dec. 8, 1955. 18p. Contract W-7405-eng-43. $7.80(ph OTS); $3.30(mf OTS).

6141 A-4014
Harshaw Chemical Co., Cleveland.
ATTEMPTS TO PREPARE TRIFLUOROACETIC ACID BY THE REACTION OF COBALTIC FLUORIDES WITH ACETIC ANHYDRIDE AND ACETONITRILE. H. S. Halbedel. May 25, 1945. Decl. Jan. 18, 1956. 3p. Contract W-7405-eng-43. $1.80(ph OTS); $1.80(mf OTS).

6142 M-3029
Du Pont de Nemours (E. I.) and Co. Jackson Lab. Wilmington, Del.
DIAPHRAGM MATERIALS FOR ELECTROLYTIC FLUORINE CELLS. Problem Report. J. C. Smith. June 28, 1943. Decl. Jan. 13, 1956. 6p. (JWD-1). $1.80(ph OTS); $1.80(mf OTS).

The corrosion resistance of various materials to F_2 was tested. (L.M.T.)

6143 N-1617
Chicago. Univ. Metallurgical Lab.
THE THERMODYNAMIC PROPERTIES OF SOME FLUORIDES OF U AND Pu. N. R. Davidson. Sept. 18, 1944. Decl. Jan. 30, 1956. 4p. (MUC-GTS-1012). $1.80 (ph OTS); $1.80(mf OTS).

Data are summarized on the heat of formation, entropy, oxidation, and hydrolysis of UF_4. Chemical reactions involving plutonium fluorides are also discussed. (B.J.H.)

GRAPHITE

6144 AECD-3913
United Carbon Products Co., Inc., Bay City, Mich.
FINAL REPORT. PART II. TECHNICAL. Lynn Brooks and George T. Sermon. May 20, 1949. Decl. Dec. 7, 1955. 20p. (UCP-2). Contract [AT-30-1-Gen-127]. $0.20(OTS).

High-purity graphite with total ash content less than 10 ppm and boron less than 0.10 ppm was processed in electric granular carbon resistance furnaces. Most impurities were removed by CCl_4 with N_2 introduced into the heated zone up to 2000°C. Boron was removed by fluorinated hydrocarbon at temperatures above 2000°C. "F-12" was used to avoid reformation of CF_4. Furnace loads of 900 lbs/day were purified. (F.S.)

6145 HW-30727
Hanford Atomic Products Operation, Richland, Wash.
GRAPHITE MACHINABILITY. J. C. Ballinger. Dec. 31, 1953. Decl. Jan. 6, 1956. 14p. Contract W-31-109-Eng-52. $0.15(OTS).

An apparatus has been constructed for measuring the machinability of graphite. The depth of a hole cut into the samples by a small electric drill operating for a fixed period of time under a fixed load is used as an index of the machinability of the material. The apparatus has been used to detect unmachinable bars received in graphite production before damage to machining apparatus and costly delay of schedules occurred. It is planned that the apparatus will be used as a guide in the development of new experimental graphites, to assure that optimum machinability will be attained. (auth)

6146 HW-31928
Hanford Atomic Products Operation, Richland, Wash.
ROLE OF SURFACE AREA IN THE KINETICS OF OXIDATION OF GRAPHITE. C. N. Spalaris. May 24, 1954. Decl. Jan. 6, 1956. 23p. Contract W-31-109-eng-52. $0.25(OTS).

The effect of surface area magnitude on the oxidation rate of graphite – CO_2 and graphite – O has been investigated by comparing the initial surface areas of several graphite samples and their rate of oxidation in an oven and in the piles. The role of graphite binding material in the mechanism of graphite – gas oxidation system has been investigated, and its significance discussed. On the basis of results obtained, it seems probable that surface area of graphite as a measurable parameter can be used to monitor oxidation in the high temperature regions of the Hanford pile stack. (auth)

6147 NAA-SR-33
North American Aviation, Inc., Los Angeles.
THE ELECTRICAL CONDUCTIVITY OF IRRADIATED GRAPHITE. PART I. D. Bowen. Sept. 29, 1949. Decl. Dec. 5, 1955. 15p. Contract AT-11-1-GEN-8. $0.20 (OTS).

A theory of the electrical conductivity of irradiated graphite has been developed which explains the saturation of resistivity as a function of exposure. The saturation effect results from a competition between the increased number of carriers created by the atoms knocked from the lattice, and increased electron scattering caused by these displaced atoms and holes. A comparison of the theory with existing measurements on resistivity is given. (auth)

6148 NAA-SR-43
North American Aviation, Inc., Los Angeles.
TECHNIQUE FOR THE MEASUREMENT OF CHANGES IN THERMAL AND ELECTRICAL PROPERTIES OF PULSE-ANNEALED IRRADIATED GRAPHITE. N. S. Rasor. Feb. 28, 1950. Decl. Dec. 5, 1955. 36p. Contract AT-11-1-GEN-8. $0.25(OTS).

A method was developed for the simultaneous measurement of the changes in the thermal conductivity, electrical resistivity, and thermoelectric power of small irradiated graphite specimens upon pulse-annealing to high temperatures. The requirements of this particular problem are discussed, and a description of the apparatus and techniques designed to meet these requirements is presented. The limitations of the present apparatus are reviewed along with proposed methods for their removal. Preliminary results obtained using 212 and 1927 Mwd/at reactor-irradiated graphite pulse annealed to 1675°C are presented. (auth)

6149 NAA-SR-151
North American Aviation, Inc., Downey, Calif.
TENSILE STRENGTH OF URANIUM IMPREGNATED GRAPHITE. A. E. Miller and C. R. Malmstrom. Sept. 14, 1951. Decl. Dec. 5, 1955. 10p. Contract AT-11-1-GEN-8. $0.15(OTS).

The short time tensile breaking strengths of three grades of graphite impregnated with uranium in the form of UC_2 were measured as a function of temperature. Grade C-18 graphite impregnated with 235 and 424 mg of uranium per cc showed a considerable decrease in strength at the higher temperatures as compared with unimpregnated C-18. Grades ECA and AUF graphite impregnated with 147 and 9.25 mg of uranium per cc respectively showed no decrease in strength as compared with unimpregnated specimens. The decrease in strength exhibited by C-18 is attributed to its lower density and larger pore size. (auth)

6150 TID-5244
[Clinton Labs., Oak Ridge, Tenn.]
THE ANALYSIS OF GRAPHITE. G. E. Boyd. Apr. 17, 1946. Decl. Jan. 13, 1956. 23p. $4.80(ph OTS); $2.70 (mf OTS).

6151 Y-314
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
PURIFICATION OF GRAPHITE: PRODUCTION EQUIPMENT. W. L. Ross. Nov. 15, 1948. Decl. Dec. 8, 1955. 32p. Contract W-7405-Eng-26. $0.25 (OTS).

The details of design and construction of a carbon tube furnace to purify machined graphite calutron parts to a high degree are described. Results of several purification runs made with the equipment are given. (auth)

LABORATORIES AND EQUIPMENT

6152 AECD-4097
Mound Lab., Miamisburg, Ohio.
FLOW METER FOR MEASURING AIR-FLOW THROUGH SPECIAL HOODS. Final Report. M. McEwen. Mar. 24, 1949. Decl. with deletions Jan. 20, 1956. 12p. Contract AT-33-1-GEN-53. $3.30(ph OTS); $2.40(mf OTS).

6153 TID-5020
Brookhaven National Lab., Upton, N. Y.
THE HOT LABORATORY AT BROOKHAVEN NATIONAL LABORATORY. W. E. Winsche, L. G. Stang, Jr., Gerald Strickland, P. Richards, G. J. Selvin, F. Horn, and G. Bennett. Apr. 1, 1951. Decl. Jan. 12, 1956. 19p. Contract [AT-30-2-gen-16]. $3.30(ph OTS); $2.40(mf OTS).

The Hot Laboratory has been specifically designed and built to handle and process multicurie amounts of radioactive materials. It is operated by a permanent staff in such a way that others can also use the various facilities required for this type of work. A wide variety of facilities is available, and use is already being made of them as indicated by the scope of the research and operations program presently under way. The general philosophy used in designing the building is outlined, and the facilities themselves are described in detail. 10 figures. (auth)

6154 Y-659
Oak Ridge National Lab., Y-12 Area, Tenn.
FACILITIES FOR PROCESSING ALPHA-ACTIVE ISOTOPES. F. N. Case. Sept. 1, 1950. Decl. Jan. 30, 1956. 24p. Contract W-7405-eng-26. $4.80(ph OTS); $2.70(mf OTS).

Laboratory equipment and procedures developed for processing alpha-active isotopes safely and with very low contamination and dispersal of materials have been tested with excellent results. Applied to the concentration of U^{234}, these facilities have made it possible to recycle 36 grams of U for four passes through the electromagnetic separation equipment with 99.6% recovery per cycle. A wide margin of safety in the exposure of personnel was maintained. (auth)

Refer also to abstract 6176.

RADIATION CHEMISTRY

6155 AECD-4169
Oak Ridge National Lab., Tenn.
ELECTRODECONTAMINATION OF STAINLESS STEEL. M. R. Bennett. Nov. 1, 1954. Decl. with deletions Dec. 1, 1955. 29p. Contract W-7405-eng-26. $4.80(ph OTS); $2.70(mf OTS).

In experimental studies, decontamination factors of 1000 to 3000 were obtained by electrostripping deposited radioactivity from stainless steel surfaces, used as the anode, in 2% sulfuric acid at current densities as low as 0.01 amp/in.^{2}. Stainless steel cathodes were used. The method was successfully applied to contaminated equipment. (auth)

RADIATION EFFECTS

6156 HW-17538
Hanford Works, Richland, Wash.
THE ANALYSIS OF PILE IRRADIATED HYDROCARBONS WITH THE INFRARED SPECTROMETER. Progress Report I. Technical Services Div., Analytical Section. R. H. Moore. Apr. 20, 1950. Decl. Dec. 3, 1955. 12p. Contract W-31-109-Eng-52. $0.15(OTS).

Infrared analysis of irradiated samples of benzene, naphthalene, anthracene, phenanthrene, 1,2-benzanthracene, pyrene, and 1,2,5,6-dibenzanthracene was completed. A sample of irradiated anthracene was analyzed chromatographically with results in excellent agreement with the infrared analysis. Combined chromatographic and infrared analysis showed the presence of phenyl derivatives in the irradiation products from naphthalene, anthracene, and phenanthrene. The latter two were also found to contain naphthyl derivatives. (auth)

6157 HW-31929
Hanford Atomic Products Operation, Richland, Wash.
PROMOTION OF CHEMICAL REACTION IN GAS-GRAPHITE SYSTEMS BY GAMMA RADIATION. R. E. Woodley. May 24, 1954. Decl. Jan. 5, 1956. 30p. Contract W-31-109-Eng-52. $0.25(OTS).

The effect of gamma radiation on the chemical systems graphite plus CO_2, graphite plus 85% CO_2 and 15% He, graphite plus O_2, and carbon monoxide in the absence of graphite has been investigated by exposing these systems to the intense gamma-ray flux of the MTR canal gamma facility. The extent of reaction between graphite and CO_2 is small, and the system attains equilibrium in a period which is short compared to the total exposure period. The extent of reaction between graphite and a mixture of 85% CO_2 and 15% He is even less than that found for graphite plus pure CO_2. The attainment of equilibrium is indicated. Graphite undergoes an extensive reaction with oxygen to form CO_2. The effective ion pair yield is approximately unity. Decomposition of carbon monoxide occurs with the formation of carbon dioxide and a reddish-brown solid polymer of one of the carbon suboxides with the empirical formula, C_4O_3. Results indicate the attainment of an equilibrium state. (auth)

RARE EARTHS AND RARE-EARTH COMPOUNDS

6158 A-2910
Massachusetts Inst. of Tech., Cambridge. Spectroscopy Lab.
THE SPECTROGRAPHIC DETERMINATION OF THE RARE EARTHS. David Kaufman. Mar. 22, 1946. Decl. Dec. 16, 1955. 16p. $3.30(ph OTS); $2.40(mf OTS).

6159 CT-2762
[California. Univ., Berkeley. Radiation Lab.]
THE PREPARATION OF METALLIC CERIUM BY ELECTROLYSIS FROM MOLTEN SALTS. B. J. Fontana and C. D. Thurmond. Mar. 6, 1945. Decl. Jan. 27, 1956. 12p. Contract W-7405-eng-48B. $3.30 (ph OTS); $2.40(mf OTS).

The study of the electrolysis of $CeCl_3$ from the molten

KCl–LiCl eutectic mixture was continued. The yield of metal ingot was increased to 80% in either single of continuous batch operation, but the erratic behavior previously reported was eliminated. The $CeCl_3$–KCl–LiCl system can be made to function equally well at 850 or 1000°C. A current efficiency of approximately 50% is observed at the highest cathode current density employed, about 40 amp/cm^2. Losses in the electrolytic process appear to be partly due to oxide, or oxychloride, formation when the apparatus is exposed to the atmosphere or moisture; and are apparently entirely due to "metal fog" formation when in the complete absence of O_2 or H_2O. The CeF_3–KCl–LiCl and $CeCl_3$–CaF_2–LiF systems were also studied. The yields are not quite as high as those observed in the $CeCl_3$–KCl–LiCl mixture. The so-called "anode effect" prevents electrolysis of the $CeCl_3$–CaF_2–LiF system beyond a critical point. Attempts to electrolyze from CeF_3–CaF_2–LiF and $CeCl_3$–NaF–CaF_2 were unsuccessful. (auth)

6160 UCRL-264

California. Univ., Berkeley. Radiation Lab.
CHEMISTRY DIVISION QUARTERLY REPORT [FOR] SEPTEMBER, OCTOBER, AND NOVEMBER 1948. Jan. 5, 1948. Decl. Jan. 16, 1956. 64p. Contract W-7405-eng-48 and 48B. $10.80(ph OTS); $3.90(mf OTS).

SEPARATION PROCEDURES

6161 AECD-3797

North American Aviation, Inc., Downey, Calif.
THE USE OF BROMINE TRIFLUORIDE IN THE RECOVERY OF URANIUM FROM MIXTURES OF UO_2 AND MgO. F. D. Rosen. June 10, 1953. Decl. with Deletions Dec. 5, 1955. 19p. Contract AT-11-1-GEN-8. $0.20(OTS).

A method is described for recovery of U from UO_2·MgO ceramic fuel material by the use of BrF_3. Recovery of 99.8% uranium from pressed-sintered UO_2·MgO was accomplished by grinding the material to 6μ particle size, wetting with Br and boiling with BrF_3 for 3 hours. A study of particle size vs U recovery was made. (auth)

6162 AECD-4089

Tennessee Eastman Corp., Oak Ridge, Tenn.
RECLAMATION OF CONTAMINATED KINNEY AND DIFFUSION PUMP OILS AND REMOVAL OF URANIUM THEREFROM. J. E. Lee, Jr., L. M. Aikin, and C. D. Susano. Mar. 10, 1947. Decl. Jan. 27, 1956. 24p. Contract W-7401-eng-23. (H-3.320.8). $4.80(ph OTS); $2.70 (mf OTS).

Test distillations were made with Kinney and diffusion pump oils under vacuum in order to determine accurately the temperature range over which satisfactory distillate may be collected. Also recommendations are made as to the most advisable type of heating equipment necessary to produce the required heat and maintain the desired temperature. In addition, several important refinements in the distillation equipment were checked for operational characteristics and for their efficacy in aiding the production of U free distillates. (auth)

6163 AECD-4091

Standard Oil Development Co., Elizabeth, N. J.
PROGRESS REPORT FOR AUGUST 1948. Sept. 1, 1948. Decl. Jan. 27, 1956. 13p. Contract AT-30-3-GEN-3. (SOD-10). $3.30(ph OTS); $2.40(mf OTS).

Studies on the application of mixer-settler type extraction equipment to the Redox Process are reported. (T.W.S.)

6164 AECD-4093

Tennessee Eastman Corp., Oak Ridge, Tenn.
RECOVERY OF URANIUM FROM CONTAMINATED PRECIPITRON OIL. J. E. Lee, L. M. Aikin, and C. D. Susano. Apr. 17, 1947. Decl. Jan. 27, 1956. 8p. Contract W-7401-eng-23. (H-3.320.7). $1.80(ph OTS); $1.80(mf OTS).

The distillation and residue extraction recovery procedures developed for the recovery of U from Kinney and diffusion pump oil, were applied to contaminated precipitron oil. The effectiveness and advisability of using the method, in whole or in part, is discussed, and various recommendations for processing this particular type of oil are presented. Additional contaminating substances present in this type oil added to the complexity of the problem, but a satisfactory recovery procedure was, nevertheless, successfully developed. (auth)

6165 AECD-4120

Tennessee Eastman Corp., Oak Ridge, Tenn.
SEPARATION OF TUBALLOY [URANIUM] FROM TANTALUM BY THE CHLORINATION DISTILLATION PROCESS. R. H. Adams, J. A. Rogers, E. L. Wagner, and A. J. Miller. Feb. 6, 1946. Decl. Feb. 2, 1956. 11p. Contract W-7401-eng-23. (C-2.350.7). $3.30(ph OTS); $2.40(mf OTS).

Uranium can be effectively separated from Ta filaments by chlorination of the filaments and subsequent distillation and condensation of $TaCl_5$. Apparatus for chlorination of filaments and distillation separation in one unit is under consideration. Chemical methods of separation of uranium from distillation residues are being tested. (auth)

6166 AECD-4153

Tennessee Eastman Corp., Oak Ridge, Tenn.
RECOVERY OF TUBALLOY FROM SURFACE DEPOSITS. PART II. INSULATORS AND BUSHINGS. C. P. Johnston. Oct. 4, 1945. Decl. Feb. 15, 1956. 7p. Contract W-7401-eng-23. (C-0.320.2). $1.80(ph OTS); $1.80(mf OTS).

6167 AECD-4195

Hanford Works, Richland, Wash.
SYNTHESIS AND PROPERTIES OF METHYLISOPROPYLDIKETONE AND 1,1-DINITROISOBUTANE AND THEIR ANALYTICAL DETERMINATION IN HEXONE–NITRIC ACID SYSTEMS. Robert M. Wagner. Aug. 12, 1949. Decl. with deletions Dec. 6, 1955. 14p. Contract [W-31-109-eng-52]. $3.30(ph OTS): $2.40 (mf OTS).

6168 CC-2626

[Chicago. Univ. Metallurgical Lab.]
TRANSFERENCE AND ADSORPTION ON GLASS OF CARRIER FREE ZIRCONIUM. H. W. Dodgen and G. Y. Rollefson. Jan. 3, 1945. Decl. Feb. 2, 1956. 4p. Contract W-7405-eng-48B. $1.80(ph OTS); $1.80(mf OTS).

6169 CC-3623

Argonne National Lab., Lemont, Ill.
PROCEDURES FOR THE SEPARATION OF PRODUCTS RESULTING FROM BOMBARDMENT OF HEAVY ELEMENTS. Roy Thompson. Sept. 23, 1946. Decl. Jan. 18, 1956. 24p. Contract W-31-109-eng-38. $4.80(ph OTS); $2.70(mf OTS).

6170 CN-2621

[Chicago. Univ. Metallurgical Lab.]
RATE OF SOLUTION OF α AND β $BiPO_4$ IN HNO_3 SOLUTIONS. R. P. Schuman and W. Rubinson. Mar. 17, 1945. Decl. Feb. 2, 1956. 18p. Contract W-7401-eng-37. $3.30(ph OTS); $2.40(mf OTS).

Rate constants, k, for the solution of α and β $BiPO_4$ in HNO_3 solutions of various activation energies for the solution process were determined. For α $BiPO_4$, k is of the order of 5×10^{-4} liters/meter^2 sec, and for the β form, 5×10^{-5}. The rate constants increase with decreasing acid concentration, and with increasing temperature. The activation energy of the solution process is, roughly, 12,000 cal/mol. Neither rate constants nor activation energies are de-

termined accurately, but they provide a good overall picture of how $BiPO_4$ dissolves. (auth)

6171 CN-2827
[Clinton Labs., Oak Ridge, Tenn.]
THE SEPARATION AND PURIFICATION OF CARRIER-FREE FISSION PRODUCTS, INCLUDING INDIVIDUAL RARE EARTHS, BY SPECIFIC ELUTION FROM AMBERLITE RESIN. Waldo E. Cohn. June 1, 1945. Decl. Dec. 14, 1955. 66p. Contract W-7405-eng-39. $10.80(ph OTS); $3.90(mf OTS).

Progress is reported in studies on the separation and purification of carrier-free fission products by adsorption methods. (C.H.)

6172 CN-3222
[Clinton Labs., Oak Ridge, Tenn.]
EQUIPMENT DEVELOPMENT AND SEMI-WORKS FOR METAL RECOVERY. Final Report—Problem Assignment No. TX2-3. R. B. Briggs. Sept. 24, 1945. Decl. Feb. 14, 1956. 57p. Contract W-7405-eng-39. $9.30(ph OTS); $3.60(mf OTS).

Tests were run on a semi-works scale to determine the feasibility of the metal recovery processes. It was found that both the phosphate and the freezing pre-extraction processes were operable. Of the two the freezing process appeared to be the more satisfactory. The solvent extraction process was satisfactory for recovering the metal from the aqueous solutions; however, it was not found possible to achieve the necessary decontamination in the extraction step or in the decontamination step. At the time the operations in the semi-works were concluded, the only procedure which it appeared might give sufficient decontamination was one which involved passing the uranium through two extraction steps. Subsequent chemical work showed that a final precipitation of the uranium with hydrogen peroxide probably would give the necessary additional decontamination. (auth)

6173 CN-3342
California. Univ., Berkeley. Radiation Lab.
THE EFFECT OF BETA RADIATION UPON THE THORIUM OXALATE PROCESS. J. W. Hamaker. Nov. 12, 1945. Decl. Jan. 18, 1956. 9p. Contract W-7405-eng-48B. $1.80(ph OTS); $1.80(mf OTS).

Beta radiation at plant-level intensities did not significantly affect the coprecipitation of Pu with $Th(C_2O_4)_2$. (C.W.H.)

6174 CN-3348
Clinton Labs., Oak Ridge, Tenn.
CONCENTRATION HISTORY OF IMPURITIES IN THE ADSORPTION EXTRACTION CYCLE. Final Report [for] October 15, 1943 to May 15, 1944 [on] Problem Assignment No. 202-X28C. Part VIII. J. A. Swartout. May 28, 1946. Decl. Feb. 16, 1956. 19p. Contract W-7405-eng-39. $3.30(ph OTS); $2.40(mf OTS).

6175 DP-18
Du Pont de Nemours (E. I.) & Co. Savannah River Lab., Augusta, Ga.
D-M PROCESS STUDY. H. S. Kemp. Nov. 1953. Decl. Dec. 28, 1955. 30p. Contract AT(07-2)-1. $0.25(OTS).

The dual-temperature exchange process for concentration of heavy water is discussed. Requirements have been estimated for an assumed set of operating conditions in a plant to produce heavy water as a 15 mole % solution in light water. Among the undesirable qualities of the dual-temperature process are the estimated high plant investment, uncertainties about equilibrium conditions and corrosion, and the large inventory of isopropyl mercaptan, a highly toxic chemical. No further study of the process was made. (auth)

6176 ISC-155
Ames Lab., Ames, Iowa.
AN APPARATUS FOR COUNTER CURRENT LIQUID–LIQUID SOLVENT EXTRACTION. H. A. Wilhelm. Jan. 24, 1951. Decl. Jan. 27, 1956. 14p. Contract W-7405-Eng-82. $1.80(ph OTS); $1.80(mf OTS).

An extraction device which, by interrupted rotation, provides for intermittent countercurrent mixing and separation of two liquid phases is described and illustrated. Addition of any number of stages and completely automatic operation is possible. Although originally built to obtain data on countercurrent extraction column operating conditions, the apparatus has effected separations, such as Zr from Hf and other impurities, with such high efficiency that a semipilot plant unit is being constructed as a possible alternate to large-scale column separation. (G.Y.)

6177 K-292
Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.
PYROHYDROLYSIS OF PRECIPITATES DERIVED FROM MOCK HL-45. H. A. Bernhardt, W. Davis, Jr., and M. R. Skidmore. Oct. 27, 1948. Decl. Feb. 8, 1956. 10p. (KLO-42). $1.80(ph OTS); $1.80(mf OTS).

Pyrohydrolysis as a method of removing phosphate from mock HL-45 material was tried on the following solids: 1) sodium hydroxide precipitate of dissolved mock HL-45; 2) ammonium hydroxide precipitate of dissolved mock HL-45; 3) filtered mock HL-45; 4) UO_2HPO_4. In the case of the filtered mock HL-45, 53% phosphate removal has been accomplished, but only after prolonged reaction at 1275°C. The extent of removal of phosphate from the other solids is negligible, even at this temperature. As a plant method of removing phosphate from the four solids tested, pyrohydrolysis is of little value. (auth)

6178 K-383
Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.
HYDROGENATION OF PRECIPITATES DERIVED FROM SYNTHETIC HANFORD WASTE. H. A. Bernhardt, W. Davis, Jr., and R. J. Heus. Apr. 11, 1949. Decl. Jan. 6, 1956. 13p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

The removal of P from certain solids derived from Hanford waste would yield residues contaminated only by very small amounts of elements that form volatile fluorides. Therefore, dry fluorination might be used to recover U as relatively pure UF_6. High-temperature (800 to 1000°C) hydrogenation was tried as a method of phosphate removal from three solids derived from synthetic Hanford waste and also from uranyl monohydrogen phosphate. Extensive removal of P was achieved at 1000°C, but only after relatively long exposures (10 hours) of small samples (5 to 10 gm). It is concluded that the high-temperature hydrogenation of solids derived from Hanford waste would be an inefficient and expensive method for removing P from such solids. (auth)

6179 K-577
Carbide and Carbon Chemicals Div. K-25 Plant, Oak Ridge, Tenn.
THE RECOVERY OF URANIUM FROM HYDROCARBON OIL AND ORGANIC COMPOUNDS. S. P. Vavalides. Mar. 16, 1950. Decl. Feb. 8, 1956. 7p. Contract W-7405-eng-26. $1.80(ph OTS); $1.80(mf OTS).

Essentially 100% recovery of U was achieved by adding $Ca(OH)_2$ and heating the mixture. Uranium is removed as calcium diuranate and UF_4 by filtering. (K.S.)

6180 M-1349
North Carolina. Univ., Chapel Hill.
A SINGLE COLUMN UNDER CONTINUOUS OPERATION.

Nathan Rosen. [194?]. Decl. Jan. 6, 1956. 7p. $1.80 (ph OTS); $1.80(mf OTS).

6181 M-1350

North Carolina. Univ., Chapel Hill.

APPROACH TO EQUILIBRIUM OF A SINGLE COLUMN. I. INFINITE RESERVOIR. Nathan Rosen. Apr. 18, 1944. Decl. Jan. 11, 1956. 15p. Charge $3.30(ph OTS); $2.40(mf OTS).

6182 M-2179

Brown Univ., Providence.

DISTRIBUTION OF $RO_2(NO_3)_2$ BETWEEN ORGANIC SOLVENTS AND H_2O–SYSTEM DIBUTOXY TETRAETHYLENE GLYCO–H_2O. "M" Report No. 14. Charles A. Kraus. July 1, 1944. Decl. Jan. 26, 1956. 3p. $1.80(ph OTS); $1.80(mf OTS).

Preliminary results are given for the distribution, as well as approximate values of the solubility of dibutoxy tetraethylene glycol in H_2O. (L.M.T.)

6183 M-3082

Princeton Univ., N. J. Frick Chemical Lab.

EXTRACTION OF MOLYBDENUM BY CUPFERRON AND CHLOROFORM. D. R. Norton. Nov. 12, 1945. Decl. Jan. 10, 1956. 5p. $1.80(ph OTS); $1.80(mf OTS).

In the standard ore procedure (determination of U_3O_8 in high- and low-grade ores) it is important to know how completely Mo is extracted during the oxidized cupferron step. In the study reported here the following variables were tested systematically: (1) various amounts of Mo at a fixed acidity, (2) use of a fixed amount of Mo and various acidities ranging up and down from the standard ore concentrations, and (3) effect of U and other substances in the extraction of Mo at a fixed acidity. (L.M.T.)

6184 M-4540

Linde Air Products Co. Tonawanda Lab., Tonawanda, N. Y.

PROPOSED METHOD OF PRODUCTION OF HIGH PURITY URANIUM ORE CONCENTRATES. E. O. Brimm. Jan. 22, 1947. Decl. Jan. 12, 1956. 4p. $1.80(ph OTS); $1.80(mf OTS).

A peroxide precipitation method for separation of U contained in acid leach liquors from V, Fe, Si, and Al was investigated. Substitution of peroxide precipitation for the present processing did not appear warranted. (J.E.D.)

6185 MITG-215

Massachusetts Inst. of Tech., Watertown. Mineral Engineering Lab.

THE ELECTROLYSIS OF URANIUM–CONTAINING PHOSPHORIC ACID SOLUTIONS. Galen W. Clevenger. Apr. 12, 1950. Decl. Jan. 11, 1956. 9p. Contract AT-30-1-gen-211. $1.80(ph OTS); $1.80(mf OTS).

Commercial and synthetic solutions of H_3PO_4 were electrolyzed, using various electrodes and types of cells, to remove U from solution. The results were negative. (auth)

6186 MITG-231

Massachusetts Inst. of Tech., Cambridge. Mineral Engineering Lab.

RECOVERY OF URANIUM FROM CLIMAX BRANNERITE CONCENTRATE, C-7. D'Arcy R. George. Mar. 8, 1950. Decl. Jan. 11, 1956. 10p. Contract AT-30-1-Gen-211. $3.30(ph OTS); $2.40(mf OTS).

From 95 to 99% of the U was extracted from brannerite concentrates by digesting the sample with concentrated H_2SO_4 and then leaching with water, using one ton of acid per ton of concentrate. Precipitates containing from 16 to 48% U_3O_8 were obtained from the pregnant solutions. Further research on the precipitation of U and the recovery of W is needed to determine the proper treatment. (auth)

6187 MITG-232

Massachusetts Inst. of Tech., Cambridge. Mineral Engineering Lab.

APPLICATION OF THE SOLVENT LEACHING PROCESS FOR THE CONCENTRATION OF URANIUM FROM SUNSHINE ORES. Paul Galvanek, Jr. Mar. 20, 1950. Decl. Jan. 11, 1956. 10p. Contract AT-30-1-Gen-211. $1.80(ph OTS); $1.80(mf OTS).

Preliminary application of the MIT organic solvent leaching process, to the Sunshine ores and flotation products has shown favorable results. Ether leaching of dry nitrated Sunshine materials yielded 89 to 97% recovery of the uranium in the various products, and overall recoveries of 50 to 91%, depending on the products leached. Reagent consumptions averaged 10 to 20 lb each of nitric acid and diethyl ether per pound of recovered uranium. (auth)

6188 MonC-145

[Clinton Labs., Oak Ridge, Tenn.]

SOLVENT EXTRACTION FOR URANIUM RECOVERY FROM HOMOGENEOUS PILE SOLUTION. Progress Report [for] Period June 1, 1945–July 1, 1946. Problem Assignment Number: TX 5-11. W. H. Baldwin. Aug. 23, 1946. Decl. Jan. 13, 1956. 33p. Contract W-7405-eng-39. $6.30(ph OTS); $3.00(mf OTS).

A large number of solvents were tested for extracting from $UO_2(NO_3)_2$ reactor fuel solutions. (K.S.)

6189 MonN-139

[Clinton Labs., Oak Ridge, Tenn.]

PREPARATION OF $Th^{234}(UX_1)$. Final Report [for] January 1946 to June 1946 [on] Problem Assignment TX5-11. W. K. Eister, G. P. Monet, and F. L. Steahly. Aug. 9, 1946. Decl. Jan. 10, 1956. 17p. Contract W-7405-eng-39. $3.30(ph OTS); $2.40(mf OTS).

Th^{234}, produced by decay of U^{238} in UNH, can be extracted by IR-100 Amberlite resin. After adsorption, the resin is washed with 0.6N H_2SO_4 and Th^{234} is eluted with 0.5M oxalic acid. Further concentration of the solution is possible by using a $Th(C_2O_4)_2$ precipitation with added Th carrier. (K.S.)

6190 MonN-231

Clinton Labs., Oak Ridge, Tenn.

RADIATION EFFECTS IN SOLVENT EXTRACTION PROCESSES. J. P. McBride, C. J. Hochanadel, and A. O. Allen. Dec. 30, 1946. Decl. Jan. 11, 1956. 14p. Contract W-35-058-eng-71. $3.30(ph OTS); $2.40(mf OTS).

Irradiation by fast electrons had no effect on the efficiency of extraction of U or Pa by various solvents from solutions containing fission products or Th. (auth)

6191 N-2205

[Chicago. Univ. Metallurgical Lab.]

SUMMARY OF PLUTONIUM CARRYING AGENTS. B. B. Cunningham. Jan. 16, 1946. Decl. Jan. 16, 1956. (MUC-GTS-2148). $7.80(ph OTS); $3.30(mf OTS).

6192 ORNL-5

Oak Ridge National Lab., Tenn.

THE APPLICATION OF COUNTER-CURRENT BATCH EXTRACTION PRINCIPLES TO PROBLEMS OF INORGANIC CHEMISTRY. Technical Division, Chemical Process Development Section Progress Report [for] Period August 1, 1947 to December 1, 1947. W. H. Baldwin. Mar. 3, 1948. Decl. Jan. 30, 1956. 8p. $1.80(ph OTS); $1.80(mf OTS).

Studies on the synthesis, the isolation from complex mixtures and the purification of organic compounds, particularly those with biological activity, have stimulated the development of countercurrent batch extraction techniques. This process has been used as an analytical tool to study

complex mixtures. Certain similarities exist between the conditions of application of the method to biochemical problems and the conditions of the solvent extraction purification of uranium. Therefore, the countercurrent batch extraction principle has been applied to the "25" recovery process and to other problems in the separation of radioactive isotopes. (auth)

6193 UCRL-585

California. Univ., Berkeley. Radiation Lab.
ALKYL PHOSPHORIC ACIDS AS EXTRACTION AGENTS FOR URANIUM. D. C. Stewart. Jan. 27, 1950. Decl. Dec. 8, 1955. 16p. Contract W-7405-eng-48. $3.30(ph OTS); $2.40(mf OTS).

Alkyl phosphoric acids were tested as a means for extracting U from non-salted solutions. These acids were miscible in acid solutions. The use of an organic solvent carrier was useful in overcoming this difficulty, and n-butyl phosphoric acid had a strong extractive effect on UO_2 ion. (K.S.)

6194 UCRL-778

California. Univ., Berkeley. Radiation Lab.
THE ACTIVITY COEFFICIENTS OF THENOYLTRIFLUOROACETONE IN PENTAETHER. H. W. Crandall and D. L. Heisig. Aug. 8, 1950. Decl. Dec. 6, 1955. Contract W-7405-eng-48. $0.20(OTS).

The distribution coefficients of TTA in pentaether–water–nitric acid mixtures were measured as a function of TTA and nitric acid concentrations. The activity coefficients of TTA in pentaether containing 0.1M nitric acid and 2.7M water were calculated. The predominant form of TTA in wet pentaether was shown to be the hydrate. (auth)

6195 UCRL-1169

California. Univ., Berkeley. Radiation Lab.
THE EXTRACTION MECHANISM OF PLUTONIUM(IV) TTA CHELATE IN SEC-BUTYLBENZENE-NITRIC ACID-URANYL NITRATE MIXTURES. D. L. Heisig and T. E. Hicks. July 30, 1952. Decl. Dec. 8, 1955. 75p. Contract W-7405-eng-48. $0.45 (OTS).

The rate of extraction of Pu(IV) in the sec-butylbenzene–thenoyltrifluoroacetone (TTA)–nitric acid system, both with and without uranyl nitrate, has been found to be limited by the rate of transfer of Pu(IV) across the organic-aqueous boundary layer. The main species of Pu(IV) which transfer appear to be PuK^{+3} and PuK_2^{++} or these ions complexed with nitrate ions, the neutral molecules $PuK(NO_3)_3$ and $PuK_2(NO_3)_2$ being the probable transferring species. In these formulas K represents the chelating part of the TTA molecule. The activation energy, ΔH_g, for the rate of transfer of Pu(IV) from an aqueous phase consisting of 2.02M uranyl nitrate and 0.474M HNO_3 into a solution of TTA in sec-butylbenzene is 10,000 calories per mole, while the activation energy for the rate of the reverse transfer, ΔH_h, is 13,000 calories per mole. The heat of extraction, ΔH_e, is roughly −3,000 calories per mole. The equilibrium extraction coefficients of Pu(IV), E_m equals total Pu concentration in the organic phase divided by the total Pu concentration in the aqueous phase, have been measured as a function of TTA, hydrogen ion, and uranyl nitrate concentrations. These data indicate: (1) that at 0.5M nitrate ion concentration the main species of Pu(IV) in the aqueous and organic phases are $Pu(IV)(NO_3)_n^{+(4-n)}$ and PuK_4, respectively; and (2) that at 4.9M nitrate ion concentration partically nitrated species such as PuK_3NO_3, as well as PuK_4, exist in appreciable amounts in the organic phase. The extraction of Pu chelate from the sec-butylbenzene phase into an aqueous phase in the presence of various reducing agents was also studied. (auth)

6196 UCRL-1493

California. Univ., Berkeley. Radiation Lab.
THORIUM NITRATE DISTRIBUTION IN TRIBUTYL PHOSPHATE-CARBON TETRACHLORIDE SOLUTIONS. R. H. Gercke. Oct. 9, 1951. Decl. Dec. 7, 1955. 17p. Contract W-7405-eng-48. $0.20(OTS).

The extraction of $Th(NO_3)_4$ by TBP–CCl_4 solutions was studied. Aqueous solutions containing 0.0M to 3.0M HNO_3 and 0.0M to 2.0M $Th(NO_3)_4$ were equilibrated with both 60 and 80% by volume TBP solutions in CCl_4, and the effect of HNO_3 concentration and $Th(NO_3)_4$ concentration are discussed. Equilibrium data are presented and conclusions concerning the mechanism of extraction of thorium nitrate have been made. (auth)

6197 UCRL-1558

California. Univ., Berkeley. Radiation Lab.
MECHANICAL CHARACTERISTICS AND PERFORMANCE OF LIQUID-LIQUID EXTRACTION COLUMNS (thesis). Hugh Roberts Lehman. Nov. 1951. Decl. Jan. 11, 1956. 89p. Contract W-7405-eng-48. $13.80(ph OTS); $4.80 (mf OTS).

Representative mass transfer data for extraction of plutonium(IV)–TTA chelate has been obtained in 1-in.-diam. pulsed and packed columns. The use of TTA for Pu extraction appears feasible in this type of equipment. Pulse columns exhibit greater efficiency than packed columns under similar operating conditions with respect to both mass transfer and throughput. True film HTU's have been obtained for the first time with a solute transferring between two immiscible liquid phases. The unique ability to change the distribution coefficient at will makes the TTA system extremely useful for mass transfer studies. (auth)

6198 Y-229

Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
PROGRESS REPORT ON CARNOTITE STUDIES [FOR] AUGUST 1948. K. B. Brown, C. F. Coleman, W. R. Grimes, and C. D. Susano. Sept. 1, 1948. Decl. Jan. 27, 1956. 31p. Contract W-7405-eng-26. $6.30(ph OTS); $3.00(mf OTS).

Data are presented for the recovery of U from raw carnotite ores by leaching, from acid liquors by precipitation, and the determination of U in low-grade carnotites. (K.S.)

6199 Y-256

Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES. Progress Report [for] September 1948. K. B. Brown, C. F. Coleman, W. R. Grimes, and C. D. Susano. Oct. 7, 1948. Decl. Jan. 30, 1956. 41p. Contract W-7405-eng-26. $7.80(ph OTS); $3.30(mf OTS).

6200 Y-260

Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
PROGRESS REPORT ON SHALE STUDIES FOR THE MONTH OF SEPTEMBER 1948. K. B. Brown, W. R. Grimes, and C. D. Susano. Oct. 8, 1948. Decl. Jan. 16, 1956. 24p. Contract W-7405-eng-26. $4.80(ph OTS); $2.70(mf OTS).

Experiments are reported on the recovery of U from oil shales by H_2O leaching of the roasted ores. The effect of roasting time is emphasized. Techniques for the precipitation of hexavalent U from oil shale batches are discussed. (K.S.)

6201 Y-277

Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES. Progress Report [for] October 1948. K. B. Brown, C. F. Coleman, W. R. Grimes, and C. D. Susano. Nov. 4, 1948. 46p. Contract W-7405-eng-26. $9.30(ph OTS); $3.60(mf OTS).

Studies are reported on recovery of U from carnotite ores; recovery of U and V from acid leach liquors; comparison of the volumetric and colorimetric determinations of U in low-grade carnotites; dissolution of carnotite head samples for U analysis; dissolution of carnotite trailings for determination of U; and carnotite analysis. (J.E.D.)

6202 Y-294
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES. Progress Report [for] November 1948. K. B. Brown, C. F. Coleman, W. R. Grimes, and C. D. Susano. Dec. 8, 1948. Decl. Jan. 30, 1956. 45p. Contract W-7405-eng-26. $7.80(ph OTS); $3.30(mf OTS).

6203 Y-312
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES. Progress Report [for] December 1948. K. B. Brown, C. F. Coleman, and C. D. Susano. Jan. 6, 1949. Decl. Jan. 30, 1956. 47p. Contract W-7405-eng-26. $7.80(ph OTS); $3.30(mf OTS).

6204 Y-335
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES. Progress Report [for] January 1949. K. B. Brown, C. F. Coleman, and C. D. Susano. Feb. 7, 1949. Decl. Jan. 30, 1956. 53p. Contract W-7405-eng-26. $9.30(ph OTS); $3.60(mf OTS).

6205 Y-375
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES. Progress Report [for] March 1949. K. B. Brown, C. F. Coleman, W. R. Grimes, and C. D. Susano. Apr. 4, 1949. Decl. Jan. 30, 1956. 62p. Contract W-7405-eng-26. $10.80(ph OTS); $3.90(mf OTS).

6206 Y-396
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES—ACID PROCESS. Progress Report [for] April 1949. K. B. Brown, C. F. Coleman, and C. D. Susano. May 9, 1949. Decl. Jan. 24, 1956. 44p. Contract W-7405-eng-26. $9.30(ph OTS); $3.60(mf OTS).

6207 Y-416
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES—ACID PROCESS. Progress Report [for] May 1949. K. B. Brown, C. F. Coleman, and C. D. Susano. June 1, 1949. Decl. Jan. 30, 1956. 38p. Contract W-7405-eng-26. $6.30(ph OTS); $3.00(mf OTS).

6208 Y-440
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES—ACID PROCESS. Progress Report [for] June 1949. K. B. Brown, C. F. Coleman, and C. D. Susano. July 6, 1949. Decl. Jan. 30, 1956. 25p. Contract W-7405-eng-26. $6.30(ph OTS); $3.00(mf OTS).

6209 Y-458
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
CARNOTITE STUDIES—ACID PROCESS. Progress Report [for] July 1949. K. B. Brown and C. F. Coleman. Aug. 4, 1949. Decl. Jan. 30, 1956. 23p. Contract W-7405-eng-26. $4.80(ph OTS); $2.70(mf OTS).

6210 Y-480
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
SEPARATION OF ZIRCONIUM AND HAFNIUM: PROCESS DEVELOPMENT. Interim Progress Report. W. M. Leaders. Sept. 7, 1949. Decl. Jan. 16, 1956. 11p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

SORPTION PHENOMENA

Refer to abstract 6314.

TRANSURANIC ELEMENTS AND COMPOUNDS

6211 HW-32673
Hanford Atomic Products Operation, Richland, Wash.
THE ELECTRODEPOSITION OF PLUTONIUM FROM ACID SOLUTION. R. Ko. Sept. 7, 1954. Decl. Jan. 6, 1956. 11p. Contract W-31-109-eng-52. $0.15(OTS).

Plutonium in the tetravalent state is electrodeposited from an initially acid solution as $Pu(OH)_4$ by electrolytic base formation. Base is formed at the cathode by reduction of hydrogen and nitrate ions. The formation of acid at the anode is prevented in part by the oxidation of oxalate ion at that electrode. Plutonium is electrodeposited at 320 ma from a solution of 0.25M HNO_3, 0.10M $(NH_4)_2C_2O_4$ at stainless steel and Al cathodes with a Pt disc anode placed within 10 mm of the cathode and rotated at 200 rpm. More than 95% of the plutonium added to the cell (0.001 µg to mg) is deposited in one hour. (auth)

Refer also to abstract 6131.

TRITIUM AND TRITIUM COMPOUNDS

6212 AECD-4199
Hanford Works, Richland, Wash.
THE REGNAULT METHOD AS APPLIED TO TRITIUM PURITY DETERMINATIONS. J. W. Finnigan. Sept. 11, 1950. Decl. with deletions Dec. 7, 1955. 16p. Contract W-31-109-eng-52. $3.30(ph OTS); $2.40(mf OTS).

The Regnault Method as applied to tritium purity determinations is described. The operating difficulties, such as temperature and humidity changes, static charges, excessive vibrations, contamination with air and helium, etc., and the methods currently in use for minimizing such difficulties, are discussed. A discussion of ion-chamber calibrations, and the correlation of ion-chamber results with Regnault Method results, are included. A precision of ±1% has been obtained, but the accuracy is not yet known. (auth)

URANIUM AND URANIUM COMPOUNDS

6213 A-1788
National Bureau of Standards, Washington, D. C.
THE ELECTROMOTIVE FORCE OF THE REACTION BETWEEN CHLORINE AND URANOUS CHLORIDE IN HYDROCHLORIC ACID SOLUTION. John Keenan Taylor and Edgar Reynolds Smith. Apr. 15, 1944. Decl. Jan. 16, 1956. 10p. $1.80(ph OTS); $1.80(mf OTS).

6214 A-3166(Rev.)
Brush Labs. Co., Cleveland.
THE REDUCTION OF URANIUM FROM ITS FLUORIDE BY MAGNESIUM. C. B. Sawyer and C. H. Tower. Aug. 15, 1946. Decl. Dec. 8, 1955. 38p. $6.30(ph OTS); $3.00(mf OTS).

The development of successful methods of reducing UF_4 by Mg was accompanied by the production of 7300 lbs of U. Gas fired furnaces were designed and used in this work. About 7.5% of CaF_2 and 2% of cryolite added to the UF_4 benefited the fluxing of the melt, shortened the melting time and reduced the melting temperature. Hydrogen can replace A as a protective atmosphere even in contact with

molten U. Either an excess of Mg or an excess of UF_4 may be used with proper operating procedure. An excess of Mg does not harmfully contaminate the U. Yields up to 81% of the U contained in the tetrafluoride were obtained. (auth)

6215 AECD-3795
Brookhaven National Lab., Upton, N. Y.
STUDIES OF THE ALUMINUM – URANIUM ALLOYING REACTION. D. W. Bareis. Dec. 15, 1949. Decl. with deletions Dec. 6, 1955. 40p. $0.30(OTS).

It was found in this investigation that an alloying reaction occurred wherever and whenever clean metallic surfaces of Al and U were brought into contact within the temperature range of 250°C to 450°C. Anodization of the Al surface prevented the alloying reaction. The effects of temperature, Al purity, and pressure between the metal surfaces on the alloying reaction were studied qualitatively. The alloying reaction produced UAl_3, which appeared to be formed by the diffusion of the U through the UAl_3 layer. (auth)

6216 AECD-3832
Oak Ridge National Lab., Tenn.
PREPARATION OF SAMPLES OF 42 WEIGHT PERCENT U–Al ALLOY FOR PILE IRRADIATION TESTS. C. D. Smith. Feb. 15, 1949. Decl. with deletions Dec. 7, 1955. 13p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

Processes are described for preparing small samples of 42 wt.% U–Al alloy (uranium enriched with U^{235}) for pile irradiation studies. In the course of this work it was found that the size of the massive Al–U grains remains substantially unaltered during hot rolling. (auth)

6217 AECD-3892
Princeton Univ., N. J.
THE ABSORPTION OF FLUORINE AND URANIUM HEXAFLUORIDE BY SODIUM CARBONATE SOLUTIONS. George G. Joris and Charles D. Compton. [1946]. Decl. Jan. 11, 1956. 30p. (NNES-II-16(App. C)).

This report is based on A-3889. $6.30(ph OTS); $3.00 (mf OTS).

6218 AECD-3981
Oak Ridge National Lab., Tenn.
URANIUM HYDRIDE: A SURVEY. A. S. Kitzes. Apr. 10, 1950. Decl. with deletions Dec. 2, 1955. 13p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

The results of a survey to determine the feasibility of producing non-pyrophoric UH_3 in tonnage quantities are presented. It is debatable whether or not UH_3 can be made non-pyrophoric. UH_3 compacts with a density of 9 g/cc can probably be made and the compacts "canned." Temperature stability data are given but no radiation stability data are available. UH_3 cannot be mixed with molten Pb, Bi, Sn, or Cd since the U-metal alloy is formed releasing H_2. Compressing UH_3 and powdered Pb gives low-density compacts. No cost data are available; Metal Hydrides Incorporated, the only commercial producers of hydrides would not commit themselves on cost or production of non-pyrophoric material until a sample was made under plant conditions. (auth)

6219 AECD-4010
Iowa State College, Ames.
IMPROVED DIRECTIONS FOR THE PREPARATIONS OF $X(OC_2H_5)_5$. Henry Gilman. Apr. 12, 1943. Decl. Jan. 11, 1956. 9p. $1.80(ph OTS); $1.80(mf OTS).

6220 AECD-4086
Yale Univ., New Haven.
ON CERTAIN PHASE EQUILIBRIA IN THE TERNARY SYSTEM URANYL NITRATE–ETHER–WATER AT 25° AND AT 1°C. Ralph G. Van Name. Oct. 22, 1942. Decl. Jan. 30, 1956. 5p. (3X-R-114). $1.80(ph OTS); $1.80 (mf OTS).

6221 AECD-4087
Tennessee Eastman Corp., Oak Ridge, Tenn.
FACTORS AFFECTING THE PRECIPITATION OF TUBANYL PEROXIDE [UO_4] FROM GUNK SOLUTIONS AT REDUCED TEMPERATURES. PART II. ALPHA. K. B. Brown, W. C. Davis, E. L. Wagner, and A. J. Miller. Mar. 26, 1945. Decl. Jan. 18, 1956. 23p. Contract W-7401-eng-23. (CD-4105). $4.80(ph OTS); $1.80(mf OTS).

Uranium peroxide was precipitated from uranyl solutions by filtering on a rotary Oliver filter after adding coagulating agents at low temperatures. This procedure gives a filterable precipitation and quantitative recovery to the extent of < 10 mg of U remaining in one liter of effluent. (F.S.)

6222 AECD-4092
Tennessee Eastman Corp., Oak Ridge, Tenn.
RECOVERY OF URANIUM FROM OIL DISTILLATION RESIDUE. J. E. Lee, Jr., L. M. Aikin, and C. D. Susano. Feb. 24, 1947. Decl. Jan. 27, 1956. 11p. Contract W-7401-eng-23. (H-3.320.6). $3.30(ph OTS); $2.40(mf OTS).

The separation and purification of uranium from oil distillation residues by dissolution of the residues in trichloroethylene followed by extraction with HNO_3 are discussed. Uranium recoveries (~99%) were obtained. (C.W.H.)

6223 AECD-4112
Tennessee Eastman Corp., Oak Ridge, Tenn.
EFFECT OF IRON ON THE LOW TEMPERATURE PRECIPITATION OF TUBANYL [URANYL] PEROXIDE IN BETA. K. B. Brown, D. H. Swanson, E. L. Wagner, and A. J. Miller. Sept. 4, 1945. Decl. Jan. 30, 1956. 9p. Contract W-7401-eng-23. (C-2.375.2). $1.80(ph OTS); $1.80(mf OTS).

In the low-temperature precipitation of uranyl peroxide from Beta gunks, process modifications are described which minimize the effect of Fe on decomposition of H_2O_2. These include the addition of excess H_2O_2 to the slurry only after attaining a reduced temperature, the use of malonic and acetic acid complexing when the H_2O_2 is added at room temperature, and the use of wetting agents when the entire process is carried out at 2°C. (auth)

6224 AECD-4114
Tennessee Eastman Corp., Oak Ridge, Tenn.
SEPARATION OF IRON AND TUBALLOY WITH PHTHALIC ACID. R. E. Hoffman, G. M. Armstrong, A. J. Miller, and J. W. Gates, Jr. Jan. 17, 1945. Decl. Jan. 30, 1956. 6p. Contract W-7401-eng-23. (CD-496). $1.80(ph OTS); $1.80(mf OTS).

Phthalic acid will remove 95 to 98% Fe with up to 8% U from concentrated U solutions containing not more than 0.6% Fe. (F.S.)

6225 AECD-4115
Tennessee Eastman Corp., Oak Ridge, Tenn.
THE REACTION OF FERRIC CHLORIDE WITH URANIUM TETRACHLORIDE. B. M. Haines and V. P. Calkins. Jan. 20, 1947. Decl. Jan. 27, 1956. 5p. Contract W-7401-eng-23. (H-8.385.14). $1.80(ph OTS); $1.80(mf OTS).

Solid $FeCl_3$ reacts with solid UCl_4 to form a complex iron-uranium chloride compound at approximately 263°. The vapor pressure of this compound is nearer to that of UCl_4 than to the vapor pressure of $FeCl_3$. (auth)

6226 AECD-4118
Tennessee Eastman Corp., Oak Ridge, Tenn.
THEORETICAL CONSIDERATION OF THE GEOMETRICAL STRUCTURE OF THE URANIUM HALIDES. V. P. Calkins. Dec. 2, 1946. Decl. Jan. 27, 1956. 8p. Contract W-7401-eng-23. (H-8.385.10). $1.80(ph OTS); $1.80(mf OTS).

The theoretical study of U halides indicates that pentavalent U halides are geometrically but not energetically capable of existence except as double halide compounds of hexavalent and tetravalent U. (F.S.)

6227 AECD-4123
Tennessee Eastman Corp., Oak Ridge, Tenn.
SPECTROPHOTOMETRIC EVIDENCE FOR THE EXISTENCE OF UCl_5 AS A DOUBLE COMPOUND OF UCl_6 AND UCl_4. C. C. Sterett and V. P. Calkins. Dec. 9, 1946. Decl. Jan. 30, 1956. 22p. Contract W-7401-eng-23. (H-8.385.11). $4.80(ph OTS); $2.70(mf OTS).

Spectrophotometric evidence for the existence of UCl_5 as a double compound of UCl_6 and UCl_4 has been obtained by studying the absorption spectra of these chlorides in CCl_4 and $SOCl_2$ solutions in the visible and ultraviolet regions of the spectrum. (auth)

6228 AECD-4136
[Battelle Memorial Inst., Columbus, Ohio.]
PROGRESS REPORT FOR THE MONTH OF MARCH 1947. E. J. Center, H. R. Nelson, H. A. Pray, A. C. Richardson, and J. D. Sullivan. Mar. 31, 1947. Decl. Jan. 25, 1956. 20p. Contract W-38-094-eng-27. (BMI-JDS-9). $3.30 (ph OTS); $2.40(mf OTS).

The most promising methods for U recovery from acid phosphate solutions appear to be precipitation with an organic amine and extraction with an ether solvent. Uranium recovery with an organic amine from synthetic solutions was 50 to 100% at a pH slightly below 2. Solvent extraction made high U recoveries but cation exchange and calcining and leaching with Na_2CO_3 would not extract U. (F.S.)

6229 AECD-4196
Hanford Works, Richland, Wash.
DETERMINATION OF URANIUM IN ALUMINUM–SILICON ALLOYS. E. M. Kinderman and M. M. Jones. Dec. 3, 1951. Decl. with deletions Dec. 5, 1955. 9p. Contract W-31-109-eng-52. $1.80(ph OTS); $1.80(mf OTS).

Chlorination of Al–Si alloys produces a volatile chloride fraction which contains Al and substantially all (97 to 99%) of the U. This fraction is readily soluble in H_2O producing a solution containing from 15 to 150 mg U/l. The chloride solution formed is analyzed for U content by direct coulometric titration or by separation of the U by a chromatographic treatment followed by a radiometric assay of the U. Uranium in the range 0.1 to 0.2% may be determined in this manner with a precision of ±10% at the 99% confidence level. The yield is in the neighborhood of 100%. The method is of particular value for samples containing enriched U. (auth)

6230 CF-52-8-162
Oak Ridge National Lab., Tenn.
DETERMINATION OF CONCENTRATION (GRAMS U/LITER) FOR ANY VALUE OF β, AT TEMPERATURE, T, IN UO_2SO_4–H_2O SOLUTIONS. H. I. Kraig. Aug. 25, 1952. Decl. Dec. 21, 1955. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Equations are presented for the determination of the uranium concentration (g/l) in UO_2SO_4–H_2O systems at any temperature for any value of β, where β is moles H_2O/moles UO_2SO_4. (C.W.H.)

6231 CF-54-6-258
Oak Ridge National Lab., Tenn.
PHYSICAL PROPERTIES OF UO_2SO_4–D_2O SOLUTIONS AND ThO_2–H_2O SLURRIES. T. W. Leland. June 18, 1954. Decl. Dec. 19, 1955. 7p. Contract [W-7405-eng-26]. $0.15(OTS).

Available data on the properties of UO_2SO_4–D_2O solutions and ThO_2–H_2O slurries are reviewed and expressed in a manner that is convenient for engineering heat transfer calculations. (B.J.H.)

6232 CT-3153
Chicago. Univ. Metallurgical Lab.
CORROSION OF METALS IN URANYL SULFATE SOLUTION. N. Goldowski, W. Carlson and L. Rucker. July 19, 1945. Decl. Jan. 30, 1956. 10p. Contract W-7401-eng-37. $1.80(ph OTS); $1.80(mf OTS).

Lead is seriously attacked at 100°C in 0.1N H_2SO_4 containing up to 4g U/liter as UO_2SO_4, the attack increasing with the U concentration. In the range 0.5 to 1.0N H_2SO_4, the corrosion product accumulated on the specimen. A protective film appeared to form on Pb in 1N H_2SO_4 at 70°C during a 15-day exposure. A somewhat thicker film was formed when the solution also contained 10^{-3}N H_2O_2. Niobium was very resistant to corrosion under the conditions studied. (auth)

6233 HW-32634
Hanford Atomic Products Operation, Richland, Wash.
IMPROVED COULOMETRIC TITRATION OF URANIUM. W. N. Carson, Jr. and L. T. Blouin. Aug. 2, 1954. Decl. Jan. 7, 1956. 18p. Contract W-31-109-eng-52. $0.20 (OTS).

An improved titration assembly and titration procedure have been developed for the automatic coulometric titration of U. The basic titration [oxidizing U(IV) to U(VI) by electrolytically generated bromine] is unchanged; the improvements in the apparatus and procedure make the titration more suitable for the routine laboratory. Precisions and accuracies using the new method are unchanged from the previous work. (auth)

6234 K-487
Carbide and Carbon Chemicals Corp., K-25 Plant, Oak Ridge, Tenn.
SOLUBILITY OF SODIUM URANYL TRI-CARBONATE IN SEVERAL ORGANIC SOLVENTS. J. S. Fox. Aug. 19, 1949. Decl. Feb. 8, 1956. 5p. (KLO-139). $1.80(ph OTS); $1.80(mf OTS).

6235 K-534
Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.
REDUCTION OF URANYL AMMONIUM PHOSPHATE. II. PHOSPHORUS REMOVAL IN THE TEMPERATURE RANGE 800 TO 1040°C. W. Davis, Jr., J. R. Flanary, and H. A. Bernhardt. Dec. 16, 1949. Decl. Feb. 8, 1956. 27p. $4.80(ph OTS); $2.70(mf OTS).

The reduction of uranyl ammonium phosphate [$UO_2NH_4PO_4$] with flowing H_2 to uranous oxypyrophosphate [$(UO)_2P_2O_7$] has been previously accomplished at 500 to 700°C. Further studies of the reduction in a stream of H_2 at temperatures of 800 to 1040°C revealed that nearly complete removal of P is possible. At 800°C, P removal is quite slow, the residual material being predominantly $(UO)_2P_2O_7$. At 1040°C, using 5 to 7g samples of $UO_2NH_4PO_4$, nearly complete removal of P has been accomplished in 12 hr. The uranium compound residue has been found to be predominantly UO_2. Within experimental error, the overall reduction and decomposition process follows a first order rate law with an activation energy of approximately 35 kcal/mol. (auth)

6236 K-551
Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.
THERMAL DECOMPOSITION OF URANYL AMMONIUM PHOSPHATE. W. S. Wendolkowski, S. S. Kirslis, and H. A. Bernhardt. Jan. 25, 1950. Decl. Dec. 27, 1955. 18p. Contract W-7405-eng-26. $0.20(OTS).

A study of the thermal decomposition of uranyl ammo-

nium phosphate in vacuo showed that the compound could be completely deamminated by heating in vacuo for 90 minutes at 500°C. A formula for the variation of decomposition rate with temperature is given. In a nitrogen stream, complete deammination of uranyl ammonium phosphate was achieved by heating for 2 hours at 600°C with a flow of 50 cc of nitrogen per minute, corresponding to a linear velocity of 12 cm. per minute. At a flow rate of 100 cc. per minute, corresponding to a linear velocity of 24 cm. per minute somewhat less than 2 hours of heating at 600°C removed all ammonia. Initial deammination rates were greater than indicated by these figures. At a given temperature the reaction rate constant for the vacuum N_2 decomposition was an order of magnitude greater than for the N_2 stream decomposition. When the decomposition was carried out in a closed reactor, the ammonia was completely removed from uranyl ammonium phosphate in 2 hours at 700°C., and 78% of the U was reduced to the tetravalent state. (auth)

6237 M-1060

Brown Univ., Providence.

PROGRESS REPORT FOR NOVEMBER 2, 1942. Charles A. Kraus. Nov. 2, 1942. Decl. Jan. 10, 1956. 12p. Contract OEMsr-688. (BT-11). $3.30(ph OTS); $2.40(mf OTS).

6238 M-1378

Du Pont de Nemours (E. I.) and Co. Jackson Lab., Wilmington, Del.

PURIFICATION OF URANIUM PEROXIDE. Problem Report [for Period May 5, 1944 to July 18, 1944]. Monroe Couper. Dec. 22, 1944. Decl. Jan. 30, 1956. 9p. (JWD-38). $1.80(ph OTS); $1.80(mf OTS).

In isolation of U peroxide from carbonate solutions, the fluoride concentration is in the 0.1 to 0.2% range and is independent of the time of holding before filtration or centrifuging. A process has been developed for bicarbonate reprocessing of U peroxide containing high fluorides and was shown to be operable by three trial runs. Processing with alkali carbonate was not found feasible with U compounds taken at several other steps of the recovery process, with the possible exceptions of sodium and calcium salts. (auth)

6239 M-2178

Brown Univ., Providence.

INVESTIGATIONS ON GUNK SOLUTION. Monthly Report No. 13. Charles A. Kraus. July 1, 1944. Decl. Jan. 31, 1956. 9p. Contract W-7405-eng-73. (BM-13). $3.30(ph OTS); $2.40(mf OTS).

The extraction of $UO_2(NO_3)_2$ from gunk solutions (containing 8% U, 0.5% Fe, 1.8% Cl, and 0.2% Cu) with organic solvents and the corrosion of various metals by these solutions is reported. (L.M.T.)

6240 M-3030

Du Pont de Nemours (E. I.) and Co. Jackson Lab., Wilmington, Del.

TENTATIVE DYE WORKS PROCESS FOR THE MANUFACTURE OF C-112 (WET CAKE) FROM C-105 SLAG-RETORT METHOD. Louis Spiegler. July 20, 1943. Decl. Jan. 27, 1956. 14p. $3.30(ph OTS); $2.40(mf OTS).

A detailed procedure for the production of peruranic acid $UO_4 \cdot 2H_2O$ from fluorine-bearing U slag is given. (L.M.T.)

6241 M-3056

[Chicago. Univ. Metallurgical Lab.]

ANALYSIS OF CERTAIN URANIUM ALLOYS. Charles V. Banks. [194?]. Decl. Jan. 10, 1956. 36p. Contract [W-7401-eng-37]. $6.30(ph OTS); $3.00(mf OTS).

Methods are summarized for the separation and determination of U in a number of U alloys. A brief discussion of the nature of the various alloys is included. The alloys include Cu-U, Ag-U, Au-U, Be-U, Zn-U, Hg-U, Al-U, Th-U, Sn-U, Pb-U, Nb-U, Ta-U, Bi-U, Cr-U, Mo-U, W-U, Mn-U, Fe-U, Co-U, and Ni-U. 136 references. (C.H.)

6242 MCW-175

Mallinckrodt Chemical Works, St. Louis.

REDUCTION OF URANYL FLUORIDE WITH HYDROGEN. A. REACTION RATE. B. REACTION MECHANISM. C. W. Kuhlman. Mar. 14, 1949. Decl. Dec. 2, 1955. 10p. Contract [W-14-108-eng-8]. $0.15(OTS).

Hydrogen reacts with UO_2F_2 in two ways: (1) $UO_2F_2 + H_2 \rightarrow UO_2 + HF$; and (2) $2UO_2F_2 + 2H_2 \rightarrow UO_2 + UF_4 + 2H_2O$. At 450 to 700°C reaction (1) predominates, but reaction (2) becomes increasingly important as the temperature is increased. Thus the reaction product is a mixture of UO_2 and UF_4. (F.S.)

6243 MITG-211

Massachusetts Inst. of Tech., Watertown. Mineral Engineering Lab.

PRELIMINARY EXPERIMENTS ON PRECIPITATION OF URANIUM FROM WET-PROCESS PHOSPHORIC ACID. E. S. Frohling, John Dasher, and David Kaufman. Dec. 17, 1948. Decl. Jan. 11, 1956. 33p. Contract AT-30-1-Gen-211. $6.30(ph OTS); $3.00(mf OTS).

More than 98% of the U_3O_8 was precipitated from H_3PO_4 produced from Florida phosphate rock by reduction with various metals and neutralization with aqueous ammonia. Favorable reducing agents were Fe, Al, Zn, and liquid Zn amalgam. More than 99% of the U_3O_8 was precipitated from the Anaconda 20% P_2O_5 undevanadized H_3PO_4 by reducing it with powdered Fe and then raising the pH with aqueous ammonia to 3.0 to 3.4. The NH_3 required was sufficient to produce $(NH_4)H_2PO_4$. Aside from the heat of the neutralization reaction, no heat was added except in one test. (auth)

6244 MITG-236

Massachusetts Inst. of Tech., Cambridge. Mineral Engineering Lab.

ALPHA COUNTING FOR ASSAY OF ETHER LEACH SOLUTIONS. Wilfred L. Freyberger. June 1, 1950. Decl. Jan. 11, 1956. 13p. Contract AT-30-1-Gen-211. $3.30(ph OTS); $2.40(mf OTS).

Analysis of ether leach solutions for uranium by β counting was found to be impossible. Alpha counting was attempted using 3 methods of producing thin U oxide films. These included: direct evaporation which gave erratic results, electroplating from sodium fluoride electrolyte which was unsuccessful, and electroplating from ammonium oxalate electrolyte which was successful on the purer samples. Alpha counting of the less pure wash and second leach solutions gave low analyses. (auth)

6245 MonT-199

[Clinton Labs., Oak Ridge, Tenn.]

THE DEVELOPMENT OF A CHEMICAL PROCESS TO OBTAIN URANIUM-237. Progress Report [for] November 1, 1945-September 15, 1946 [on] Problem Assignment No. TX5-11. F. R. Bruce, and W. H. Baldwin. Oct. 31, 1946. Decl. Jan. 26, 1956. 18p. Contract W-7405-eng-39. $4.80(ph OTS); $2.70(mf OTS).

Procedures for the separation and purification of U^{237} from irradiated U are presented. Methods are given for evaluating the purity of the final product, and an analytical procedure for the use of U^{237} is described. (C.W.H.)

6246 TID-5101

Battelle Memorial Inst., Columbus, Ohio.

THE ADSORPTION OF URANIUM FROM SOLUTIONS BY ACTIVATED CARBON. James C. Goodrich. Aug. 15, 1949. Decl. Jan. 13, 1956. 13p. $3.30(ph OTS); $2.40(mf OTS).

Experimental results on the adsorption of U from solu-

tions by activated C indicate that low pH values reduce the adsorption and that a marked change occurs in the adsorption of U(VI) at pH 2. Under a given set of conditions the adsorption of U follows a typical Freundlich isotherm. The particle size of the charcoal affects the rate of adsorption but not the amount of U adsorbed at equilibrium. The temperature coefficient of adsorption is negligible, and the adsorption of U from uranyl solutions is a reversible process. (B.J.H.)

6247 Y-327

Carbide and Carbon Chemicals Co. Y-12 Plant, Oak Ridge, Tenn.

THE EXTRACTION OF SMALL AMOUNTS OF URANIUM FROM MAGNESIUM NITRATE SOLUTIONS WITH DIBUTYL CARBITOL. J. M. Googin and T. P. Sprague. Jan 20, 1949. Decl. Dec. 6, 1955. 29p. Contract W-7405-eng-26. $0.25(OTS).

The distribution of $UO_2(NO_3)_2$ between $Mg(NO_3)_2 - HNO_3$ solution and dibutyl carbitol was investigated. The extraction was found to be largely independent of the $UO_2(NO_3)_2$ concentration, to decrease with increased HNO_3 at high $Mg(NO_3)_2$ concentrations, to increase to a maximum with increasing HNO_3 at low $Mg(NO_3)_2$ concentrations, and to be, in general, similar to the results with the other divalent nitrates. Distribution coefficients (org/aq) of 250 were obtained. (auth)

6248 Y-331

Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.

THE EXTRACTION OF URANIUM FROM SODIUM NITRATE SOLUTIONS WITH DIBUTYL CARBITOL. J. M. Googin and T. P. Sprague. Jan. 26, 1949. Decl. Dec. 6, 1955. 17p. Contract W-7405-eng-26. $0.20(OTS).

The extraction of $UO_2(NO_3)_2$ from $NaNO_3 - HNO_3$ solutions with dibutyl carbitol gave a maximum distribution coefficient of about 17 (org/aq). Nitric acid increases the distribution from that of the neutral salt solution to a maximum at a normality dependent on the $NaNO_3$ concentration. A distribution coefficient (org/aq) of 17 was obtained with 7.2N $NaNO_3$ and 0.4N HNO_3. (auth)

Refer also to abstracts 6130 and 6136.

WASTE DISPOSAL

6249 AECD-4066

Mound Lab., Miamisburg, Ohio.

RESEARCH ON REACTOR WASTE DISPOSAL. Information Report. C. S. Lowe, M. McEwen, F. C. Mead, Jr., and E. Orban. Dec. 15, 1950. Decl. with deletions Jan. 10, 1956. 29p. Contract AT-33-1-gen-53. $4.80(ph OTS); $2.70(mf OTS).

Laboratory work on second decontamination cycle wastes centered around FeS precipitation, ferrous ferrocyanide precipitation, and preformed adsorbent methods. The best results were obtained with ferrous sulfide as a precipitant in conjunction with an adsorbent. It was possible to take the freshest second decontamination cycle waste solution available and to remove all the activity countable by treating first with activated C in the presence of H_2S and then precipitating ferrous sulfide three times under the same conditions. Equally good results were obtained by passing the same original solution through an activated C column and subsequently through an activated alumina column impregnated with ferrous Fe. The ferrous ferrocyanide precipitation method has removed as much as 97.9% of the activity. This treatment may have application where process time and storage capacity are of little concern, such as in a cascade system. On a continuous basis of processing second cycle crib wastes, a possible method exists in a treatment consisting of silica gel adsorption, activated alumina adsorption, metallic Fe scrub, ferrous ferrocyanide precipitation, neutralization, and filtration. The burial volume of concentrate from such a method is very low compared to the original waste volume, and expensive process solution storage is not required in the processing operations. The activity level in the final supernatants could be maintained below 300 cpm/min/ml. Decontamination of "fresh" first cycle wastes is best accomplished by repeated scavenging with FeS. Where column operation proves desirable, passage through silica gel will remove better than 99% of the gross activity, thus permitting further processing to be accomplished with relatively little shielding. Repeated use of the silica gel appears possible by stripping with oxalic acid. FeS scavenging of wastes has given decontamination factors of the order of 60, leaving residual activity of 5×10^5 cpm/min/ml. A significant amount of this residual activity is carried by a precipitation of $Fe(OH)_3$. Additional activity is removed with MnO_2 yielding an overall decontamination factor of 1×10^4. (auth)

6250 AECD-4147

Mound Lab., Miamisburg, Ohio.

LIQUID WASTE DISPOSAL RESEARCH QUARTERLY REPORT FOR JANUARY, FEBRUARY, AND MARCH 1950. Apr. 1, 1950. Decl. with deletions Feb. 16, 1956. 34p. Contract AT-33-1-GEN-53. $6.30(ph OTS); $3.00(mf OTS).

6251 AECD-4150

Mound Lab., Miamisburg, Ohio.

ENGINEERING STUDY OF EVAPORATION FOR CONCENTRATING RADIOACTIVE LIQUID WASTES. Engineering Research Final Report. R. L. Bates and M. McEwen. Nov. 1, 1950. Decl. with deletions Jan. 20, 1956. 15p. Contract AT-33-1-GEN-53. $3.30(ph OTS); $2.40(mf OTS).

The problem of evaporation of secondary radioactive wastes resulting from waste disposal studies at Mound Laboratory has been studied experimentally to determine the fundamental design characteristics of a plant size unit. Emphasis, of course, was on decontamination, but the factors affecting foaming and scaling also had to be investigated and evaluated. Generally speaking, the final design is a standard type of evaporator, the only unique feature being the relation of the two effects. Where critical, as affecting performance, the particular design features have been specified. (auth)

6252 CE-2532

Chicago. Univ. Metallurgical Lab.

ODORANTS FOR USE IN "W" STACK GASES. Final Report on a Phase of Problem No. 390-ML-51-S. R. N. Lyon. Dec. 14, 1944. Decl. Feb. 2, 1956. 5p. Contract W-7401-eng-37. $1.80(ph OTS); $1.80(mf OTS).

6253 K-218

Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.

SAMPLING OF SITE "W" SUPERNATANT LIQUOR. A. A. Abbatiello, D. H. Stewart, and J. L. Waters. May 20, 1948. Decl. Feb. 8, 1956. 15p. $3.30(ph OTS); $2.40 (mf OTS).

The procedure and equipment used to remove a 28 gallon sample of liquid from the Site "W" storage tanks are described. Radiation data taken during the sampling and recommendations for future liquid sampling programs are included in this report. (T.W.S.)

6254 KLX-1305

Kellex Corp., New York.

DECONTAMINATION OF CRIB WASTES (24-A3). Progress

Report for Second Quarter, 1950 covering period April 1–June 30, 1950 on Job 24-A. July 12, 1950. Decl. Jan. 27, 1956. 28p. Contract AT(30-1)-850. $4.80(ph OTS); $2.70(mf OTS).

6255 KLX-1377
Vitro Corp. of America, New York.
DISPOSAL OF RADIOACTIVE WASTES IN CEMENT. JOB 24-A. June 18, 1952. Decl. Dec. 5, 1955. 15p. Contract AT(30-1)-850. $0.15(OTS).

Based on the laboratory and pilot plant operations, the recommended procedure for the disposal of aqueous radioactive solutions in cement is as follows: A 55-gal drum is placed on a drum roller and is charged with approximately 25 gal of alkalized radioactive liquid waste. To this solution four 95 lb bags of Portland cement are added. The drum is then closed and rolled at 3 rpm for about 15 minutes with periodic venting to a hood to prevent excessive pressure build-up. The drum is removed from the roller and allowed to stand until the cement mixture has set, which usually takes place in about 4 hours. (auth)

6256 MLM-406
Mound Lab., Miamisburg, Ohio.
LIQUID WASTE DISPOSAL RESEARCH QUARTERLY REPORT FOR OCTOBER, NOVEMBER, DECEMBER 1949. Jan. 1, 1950. Decl. Jan. 27, 1956. 29p. Contract AT-33-1-GEN-53. $4.80(ph OTS); $2.70(mf OTS).

Progress is reported in studies on decontamination procedures for Hanford waste solutions. The work on decontamination procedures was devoted to the precipitation of radioactive elements rather than to their removal from the waste solutions. Ruthenium, Sb, and Te were precipitated as their sulfides; Cs was precipitated by either ferrous sulfide or ferrous ferrocyanide. Some work was done on the adsorption of Cs by Fuller's earth. (C.H.)

ENGINEERING

6257 M-4426
Massachusetts Inst. of Tech., Cambridge. Servomechanisms Lab.
DESIGN OF EMERGENCY ROD DRIVES. Engineering Report No. 32. J. P. Ivaska. Aug. 19, 1948. Decl. Dec. 5, 1955. 14p. $3.30(ph OTS); $2.40(mf OTS).

The emergency rod drive is powered by an induction motor coupled to a flywheel energy-storage element. Control of rod movement is accomplished by means of a variable-speed hydraulic transmission, driving the rod through a reduction gear and pinion-and-rack combination. Construction details and arrangement of the equipments are explained. (auth)

HEAT TRANSFER AND FLUID FLOW

6258 CF-53-12-94
Oak Ridge National Lab., Tenn.
CALCULATIONS FOR HRE NO. 2 HEAT EXCHANGER. C. L. Segaser. Dec. 16, 1953. Decl. Dec. 7, 1955. 21p. Contract [W-7405-eng-26]. $0.25(OTS).

Calculations are presented analyzing the heat transfer conditions encountered in the heat exchanger of the HRT. (T.W.S.)

MATERIALS TESTING

6259 AECD-3926
Battelle Memorial Inst., Columbus, Ohio.
CREEP OF 2S-O ALUMINUM SHEET AT 400 TO 450°C. W. F. Simmons and H. C. Cross. June 9, 1950. Decl. with deletions Dec. 13, 1955. 10p. Contract W-7405-eng-92. $0.15(OTS).

Creep-rupture and creep tests on 2S–O Al sheet were made at 400 and 450°C. The data show that, at 400°C, 0.5% total deformation would be produced in 10,000 hours by a stress of 250 psi. At 450°C, 200 psi would be required. On the basis of the data obtained at 400 and 450°C, it is apparent that a somewhat higher temperature could be employed before the limiting conditions of 20% deformation in one year at 60 psi would be reached. (auth)

PUMPS

6260 HW-10175
Hanford Works, Richland, Wash.
GENERAL ENGINEERING AND CONSULTING LABORATORY "HOT SERVICE" TURBINE PUMP: REDOX EQUIPMENT TESTING REPORT NO. 3. Progress Report for period May 1 to June 15, 1948. J. T. Stringer and A. W. Allen. June 21, 1948. Decl. Jan. 10, 1956. 12p. Contract [W-31-109-Eng-52]. $3.30(ph OTS); $2.40(mf OTS).

The testing of the General Engineering and Consulting Laboratories Turbine Pump No. 1 is reported. A more precise measurement of the minimum flow rate required to maintain the fluid discharge temperature at 140°F has located this at 62 ml./min. The pump was placed in a life test with water and performance characteristics (Head vs Capacity) have been measured after 0, 22, and 215 hours of operation at 3450 rpm and 25 psig. No significant change in characteristics has been noted. Mechanical operation since the start of the life test has been uniform and uneventful. It is concluded that replacement of a bent pump shaft together with worn Teflon bearings and seal ring has eliminated some of the mechanical difficulties previously encountered. (auth)

VACUUM SYSTEMS

6261 AECD-3872
Carbide and Carbon Chemicals Corp., Oak Ridge, Tenn.
A NEW TYPE OF ADJUSTABLE LEAK FOR HIGH VACUUM SYSTEMS. R. C. Wright. May 3, 1946. Decl. Nov. 28, 1955. 9p. Contract [W-7405-eng-23]. (C-15). $1.80(ph OTS); $1.80(mf OTS).

The device (called a leak) supplied with the G.E. spectrometer consists of a flattened Cu tube wound in a spiral around a shaft, the spiral reversing at the midpoint of the shaft. The rotation of the shaft controls the cross sectional area of the passage in the tubing and, consequently, the resistance it offers to gas flow. (L.M.T.)

WASTE DISPOSAL

6262 K-226
Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.
PROPOSAL FOR SAMPLING OF SITE "W" LIQUID AND SOLID WASTE. A. A. Abbatiello, R. N. Drucker, W. M. Wallace, and J. L. Waters. June 8, 1948. Decl. Feb. 8, 1956. 28p. $6.30(ph OTS); $3.00(mf OTS).

A proposal for determining some of the physical properties of liquid and solid waste by means of a specially designed densitometer is presented. The data thus gathered would be used in determining the feasibility of two types of samplers described. Operating procedures and drawings of the devices are included. The equipment was built and tested on "cold runs." (auth)

MINERALOGY, METALLURGY, AND CERAMICS

CERAMICS AND REFRACTORIES

6263 CT-3371
[Massachusetts Inst. of Tech., Cambridge.]
SLIP-CASTING OF NON-PLASTIC REFRACTORY MATERIALS. J. L. Utter. Aug. 1945. Decl. Jan. 18, 1956. 11p. Contract W-7405-eng-175. $3.30(ph OTS); $2.40 (mf OTS).

Slip casting articles of BeO, MgO, and ThO_2 required only a small amount of low-cost equipment. Rapid production attained high mechanical strength, low porosity, and irregular shapes. Precision in slip preparation is difficult but demands careful handling and is only adaptable to medium and small size articles. (F.S.)

6264 LA-1236
Los Alamos Scientific Lab., N. Mex.
BERYLLIUM OXIDE. CHAPTER 3 OF METALLURGY [LOS ALAMOS TECHNICAL SERIES] VOLUME 10. Cyril S. Smith. Dec. 31, 1945. Decl. Dec. 13, 1955. 29p. Contract W-7405-eng-36. $0.20(OTS).

Water-moistened, screened, calcined BeO powders were pressed at 15 tsi. After several hrs drying at low temperature, the bricks were heated to 1250°C in five hrs in a Hays globar furnace and held at this temperature for 3 hrs. After cooling and hand shaping in graphite dies, the dies were hot-pressed for 4 hrs and a temperature maximum of 1800°C was held for one hour at 2000 psi. While hot (1000 to 1200°C) the dies were cooled rapidly. Density varied from 2.70 to 2.80 gm/cc. (F.S.)

CORROSION

6265 A-3920
[Massachusetts Inst. of Tech., Cambridge.]
FINAL REPORT ON "K" FILAMENTS, TUNGSTEN "SLOTS" AND "J" BOXES. P. Gordon and A. R. Kaufman. [nd]. Decl. Jan. 17, 1956. 25p. $4.80(ph OTS); $2.70(mf OTS).

6266 AECD-4033
[Tennessee Eastman Corp., Oak Ridge, Tenn.]
PROGRESS REPORT ON CORROSION TESTS IN TCl_4. Donald R. Mash. May 26, 1945. Decl. Jan. 10, 1956. 13p. (JRC-25; ML-43). $3.30(ph OTS); $2.40(mf OTS).

The corrosion resistance of Hastelloy and various types of stainless steel to solid and vaporized UCl_4 was determined. Tests were run for 150 hours at 500°C and for 12 hours at 700°C. Penetration and weight loss were determined, and all samples were examined microscopically with and without a bend test. Hastelloy was found to be the most corrosion-resistant of the materials tested. (B.J.H.)

6267 ANL-4908
Argonne National Lab., Lemont, Ill.
THE CORROSION OF THORIUM. A Review of Project Literature. J. E. Draley. Oct. 3, 1952. Decl. Dec. 10, 1955. 23p. Contract W-31-109-eng-38. $0.25(OTS).

A project literature search disclosed considerable inconsistency in the aqueous corrosion of thorium, depending on metal source and sample preparation. Corrosion rates of representative metal in distilled water were of the order of 4 to 10×10^{-3} mg/cm²/hr at 100°C, and 0.7 mg/cm²/hr at 178°C. Attempts to increase the corrosion resistance of thorium were generally unsuccessful; instead corrosion rates usually were increased. Exceptions seemed to include the addition of a small amount of either beryllium or carbon. Abstracts are given of project literature concerning reaction of thorium and an alloy with gases. (auth)

6268 ANL-5030
Argonne National Lab., Lemont, Ill.
THE CORROSION OF LOW-ZIRCONIUM: URANIUM ALLOYS IN BOILING WATER. J. E. Draley, J. W. McWhirter, F. Field, and J. Guon. Apr. 14, 1953. Decl. Dec. 9, 1955. 56p. Contract W-31-109-eng-38. $0.40(OTS).

The corrosion behavior of uranium alloys containing up to about 6 wt. % zirconium was studied in boiling distilled water. Alloys containing of the order of 5 or 6 wt.% zirconium form good protective oxide films under certain conditions. So long as the protective film covers the metal surface, corrosion rates less than one-thousandth that of U are characteristically obtained. The degree of permanence of such films was not determined, although the film on one sample was observed to be still protective after three months exposure. Protective films are formed at temperatures at least as high as 155°C. Coupling the best alloys to 347 stainless steel or 2S aluminum reduced their corrosion rates noticeably in oxygen-free water at 100°C, and in oxygen-free hydrogen peroxide solutions up to about 5×10^{-4} molar. At higher peroxide concentrations, low corrosion rates were observed for uncoupled alloy. (auth)

6269 CT-3151
Chicago. Univ. Metallurgical Lab.
CORROSION OF ALUMINUM AND BERYLLIUM IN AMMONIUM CARBONATE–URANYL NITRATE SOLUTION. N. Goldowski and L. Beamon. July 19, 1945. Decl. Jan. 30, 1956. 5p. Contract W-7401-eng-37. $1.80(ph OTS); $1.80(mf OTS).

Aluminum and Be were separately exposed at 70°C in 0.5M $(NH_4)_2CO_3$ solution containing 4g U/liter added as $UO_2(NO_3)_2$. Neither metal was seriously attacked during a 10-day exposure. An eight-hr exposure in a similar solution which contained up to 0.5N H_2O_2 greatly accelerated the rate of corrosion of Al but had no effect on Be. (auth)

6270 CT-3152
Chicago. Univ. Metallurgical Lab.
CORROSION OF METALS IN URANYL NITRATE SOLUTION. N. Goldowski and L. Rucker. July 19, 1945. Decl. Jan. 30, 1956. 9p. Contract W-7401-eng-37. $1.80(ph OTS); $1.80(mf OTS).

Data on the corrosion of Al, Be, and Nb at 90°C by aqueous solutions containing up to 4 gm U/liter and up to 1N HNO_3 are presented. Al was seriously attacked, whereas Nb was very resistant during 15 days exposure, even in the presence of 10^{-3}N H_2O_2. Be was attacked to an important extent (1.5 mg/cm² in 5 days) in 0.1N HNO_3 and more rapidly in higher concentrations of HNO_3. (auth)

6271 MonT-81
[Clinton Labs., Oak Ridge, Tenn.]
EROSION OF LEAD IN URANYL SULFATE AND URANYL CARBONATE SOLUTIONS CONTAINING SUSPENDED CATALYST. Progress Report [on] Problem Assignment TX5-12. A. M. Rom and L. G. Bauer. Mar. 1, 1946. Decl. Jan. 26, 1956. 9p. Contract W-35-058-eng-71. $3.30(ph OTS); $2.40(mf OTS).

Erosion tests were run with chemical lead exposed to UO_2SO_4 and UO_2CO_3 solutions containing a suspension of Pd on charcoal. Erosion was severe in the carbonate system at flow rates above 5 ft/sec. It was not severe in the sulfate system at flow rates as great as 20 ft/sec. (auth)

6272 NBS-6
National Bureau of Standards, Washington, D. C.
SUMMARIZING REPORT ON STRESS CORROSION OF BERYLLIUM. Hugh L. Logan and Harold Hessing. [nd]. Decl. Dec. 5, 1955. 12p. $0.20(OTS).

Stress-corrosion tests were made on beryllium in a circulating 0.002 to 0.006 molar hydrogen peroxide solution at a temperature of 85 to 93°C. Extruded and pressed and sintered specimens were loaded axially to stresses as high as 90 to 95% of their yield strengths. Specimens were also stressed transversely to the direction of extrusion by bending. Exposure periods in the hot solution were as long as 1,560 hr for axially loaded extruded specimens, 1,250 hr for extruded bend specimens and 785 hr for compacted specimens. There was no evidence of stress-corrosion cracking in any of the specimens tested. Specimens that had failed in test and specimens broken after exposure under stress revealed the pitting type of corrosion only. Tensile properties and moduli of rupture of exposed specimens, broken at the conclusion of the tests, were in the range obtained in similar specimens that were tested as machined and without exposure in the corrosive medium. (auth)

6273 ORNL-772
Oak Ridge National Lab., Tenn.
THE CORROSION OF BERYLLIUM IN SIMULATED COOLING WATER FOR THE MATERIALS TESTING REACTOR. James L. English. Jan. 23, 1951. Decl. Jan. 6, 1956. 56p. Contract W-7405-eng-26. $0.35 (OTS).

The corrosion resistance of extruded and QM types of Be metal was determined for a period of one year in demineralized water at 85°C with and without 0.005M H_2O_2. In the absence of the peroxide, the corrosion resistance of the two materials was nearly identical; a value of 0.07 mil/year was observed at the end of the 12 months exposure. The presence of 0.005M H_2O_2 stimulated the corrosion rates for both metals with a more pronounced rate occurring on the QM Be. Corrosion rates of 0.17 mil/year and 0.33 mil/year were reported on extruded and QM Be, respectively, at the end of one year. Maximum pit depths on both metals were intensified with peroxide present, but there was no marked increase in the frequency of pits on either metal. The QM Be appeared more susceptible to localized attack than did the extruded metal. The expansion between adjacent extruded Be surfaces due to the accumulation of corrosion products was found to be 4.3 mils after 22.3 months in demineralized water at 85°C containing 0.005M H_2O_2. The bond at the interfaces, formed by the corrosion products, was very tenacious. The appearance of large blisters on the Be surfaces after long exposure was believed due to the hydrolysis of segregated Be carbide inclusions to amorphous $Be(OH)_2$. It was determined that this transition was accomplished by a large volume increase which may have caused sufficient internal pressures within the metal to result in the blistering effect. (auth)

Refer also to abstract 6232.

METALS AND METALLURGY

6274 AECD-3835
Mound Lab., Miamisburg, Ohio.
BISMUTH CASTING AND CANNING. (Information Report). Paul Engle. June 16, 1952. Decl. with deletions Dec. 7, 1955. 8p. Contract AT-33-1-gen-53. $1.80 (ph OTS); $1.80 (mf OTS).

General discussions are given on bismuth casting and sealing of Al irradiation containers. (B.J.H.)

6275 AECD-3843
Columbia Univ., New York. School of Mines.
TECHNICAL PAPERS OF THE SIXTH METALLOGRAPHIC GROUP MEETING, HELD AT COLUMBIA UNIVERSITY, SEPTEMBER 24, 1952. George L. Kehl, comp. July 1955. Decl. with deletions Dec. 7, 1955. 166p. $1.00(OTS).

Papers were given on the metallography of Th and Th-base alloys; Hf and Hf alloys, Zr and Zr alloys, and U at elevated temperatures; an electron microscope study of metallographic abrasives; remote metallography; the application of phase contrast and reflecting objective to metallography; a new etchant for V; and the electropolishing of Ti. (F.S.)

6276 AECD-4049
Metal Hydrides Inc., Beverly, Mass.
THE PRODUCTION OF URANIUM METAL BY METAL HYDRIDES INCORPORATED. P. P. Alexander. [1943]. Decl. with deletions Jan. 12, 1956. 31p. $6.30(ph OTS); $3.00(mf OTS).

6277 AECD-4076
Westinghouse Electric Corp. Atomic Power Div., Pittsburgh.
SINGLE BEND TESTS ON WELDED ZIRCONIUM AND ZIRCONIUM–TIN ALLOYS. H. R. Hoge. June 4, 1952. Decl. Jan. 13, 1956. 10p. Contract [AT-11-1-GEN-14]. (WAPD-RM-129). $1.80(ph OTS); $1.80(mf OTS).

An investigation was made of the effect of welding on the ductility of Zr and Zr–Sn alloys. Results are tabulated. (C.H.)

6278 AECD-4170
Los Alamos Scientific Lab., N. Mex.
THE PREPARATION AND PHYSICAL PROPERTIES OF URANIUM BINARY ALLOYS CONTAINING ALUMINUM AND COLUMBIUM. D. W. Grobecker, W. F. Arnold, J. M. Taub, and D. T. Doll. Sept. 25, 1950. Decl. with deletions Nov. 30, 1955. 39p. Contract W-7405-eng-36. $6.03(ph OTS); $3.00(mf OTS).

For increased yield strength and creep resistance of U, Al and Nb were tried as alloy agents. Al was impractical because the alloy composition couldn't be controlled, physical properties of as-cast alloy were erratic, response to solution treatment and aging was inconsistent, and structures were unpredictable. Melting difficulties with Nb were encountered but physical properties of as-cast Nb – U were superior to unalloyed U and yield strength could be elevated by heat treatment. (F.S.)

6279 BBC-5
Brush Beryllium Co., Cleveland.
PROGRESS REPORT [FOR THE] PERIOD JANUARY 1 TO JANUARY 31, 1948. D. T. Doll. Decl. Feb. 23, 1956. 22p. Contract W-22-075-Eng-11. $4.80(ph OTS); $2.70 (mf OTS).

Eleven runs produced BeF_2 to investigate the economy of production in the Luckey Retort. Iron pickup was to high and was not reduced by sublimation at a lower temperature. (F.S.)

6280 BBC-9
Brush Beryllium Co., Cleveland.
FIN TUBE PROJECT AND G. E. WASHER PROJECT PROGRESS REPORT FOR PERIOD MARCH 1 TO MARCH 31, 1948. D. T. Doll. Decl. Feb. 13, 1956. 15p. Contract AT-30-1-gen-155. $3.30(ph OTS); $2.40(mf OTS).

An electric resistance furnace designed to sinter Be powder to long fin tube lengths was constructed with a transformer to provide the required voltage. Molybdenum was found to be an unsatisfactory material for hot-pressed washers as it cannot resist alloying with Be. (F.S.)

6281 BBC-10
Brush Beryllium Co., Cleveland.
LUCKEY RETORT AND PRESSURE FURNACES PILOT PLANT OPERATIONS PROGRESS REPORT FOR PERIOD MARCH 1 TO MARCH 31, 1948. D. T. Doll. Decl. Feb. 13, 1956. 18p. Contract W-22-075-eng-11. $3.30 (ph OTS); $2.40(mf OTS).

Dry runs were made to study the characteristics of the Luckey Retort Furnace and to make adjustments in power input. BeF_2 obtained on a run yielded 84.5% based upon the bifluoride charged. Fe content averaged 0.028%. (F.S.)

6282 BBC-13
Brush Beryllium Co., Cleveland.
LUCKEY RETORT AND PRESSURE FURNACES PILOT PLANT OPERATIONS PROGRESS REPORT FOR APRIL 1 TO APRIL 30, 1948. D. T. Doll. Decl. Feb. 13, 1956. 37p. Contract W-22-075-eng-11. $6.30(ph OTS); $3.00 (mf OTS).

Six runs made in the Luckey Retort Furnace sublimed BeF_2 under conditions designed to prevent Fe pickup. Fe pickup decreased but was never less than the permissible maximum. (F.S.)

6283 BBC-16
Brush Beryllium Co., Cleveland.
LUCKEY RETORT AND PRESSURE FURNACES PILOT PLANT OPERATIONS PROGRESS REPORT FOR MAY 1 TO MAY 31, 1948. D. T. Doll. Decl. Feb. 13, 1956. 31p. Contract W-22-075-eng-11. $6.30(ph OTS); $3.00 (mf OTS).

Beryllium fluoride was produced by the reaction of BeO with $(NH_4)_2F_2$ and sublimation of the fluoride. Five runs investigated the resublimation of BeF_2. Some decrease in iron pickup was found, but it was not reduced to an acceptable level. Three remelt runs in the pressure furnace were made. Arcing developed and prohibited the achievement of a pouring temperature. (F.S.)

6284 BBC-19
Brush Beryllium Co., Cleveland.
LUCKEY RETORT AND PRESSURE FURNACES PILOT PLANT OPERATIONS PROGRESS REPORT FOR JUNE 1 TO JUNE 30, 1948. D. T. Doll. Decl. Feb. 13, 1956. 56p. Contract W-22-075-eng-11. $9.30(ph OTS); $3.60 (mf OTS).

Beryllium fluoride was produced in 14 runs in the Luckey Retort Furnace and seven runs showed less than 100 ppm Iron. Four runs were made in which melts from the Pressure Furnace were sublimed. Seven runs were made in the Pressure furnace and pourings of 3 were successful. (F.S.)

6285 BBC-22
Brush Beryllium Co., Cleveland.
LUCKEY RETORT AND PRESSURE FURNACES PILOT PLANT OPERATIONS PROGRESS REPORT FOR JULY 1 TO JULY 31, 1948. D. T. Doll. Decl. Feb. 13, 1956. 44p. Contract W-22-075-eng-11. $7.80(ph OTS); $3.30(mf OTS).

Beryllium fluoride was produced in 26 runs in the Luckey Retort Furnace but all showed too much Fe pick up. After leaching, 43.24 lbs of Be metal assaying 98.58% were obtained in the Pressure Furnace. Time requirements make this form of production uneconomical. (F.S.)

6286 BBC-25
Brush Beryllium Co., Cleveland.
LUCKEY RETORT AND PRESSURE FURNACES PILOT PLANT OPERATIONS PROGRESS REPORT FOR AUGUST 1 TO AUGUST 31, 1948. D. T. Doll. Decl. Feb. 13, 1956. 69p. Contract W-22-075-eng-11. $10.80(ph OTS); $3.90(mf OTS).

Beryllium fluoride was produced in 26 runs in the Luckey Retort Furnace. Iron pickup was over the permissible maximum. Sixteen Pressure Furance runs were made. Data from metal leaching and ball milling sublimation were compared. (F.S.)

6287 BMI-269
Battelle Memorial Inst., Columbus, Ohio.
THE BEHAVIOR OF HIGH-TEMPERATURE ALLOYS IN CRACKED-AMMONIA ATMOSPHERES. H. A. Pray, R. S. Peoples, and G. L. Ericson. June 30, 1953. Decl. Dec. 10, 1955. 136p. Contract AT-30-1-Gen-228. $0.65(OTS).

The behavior of nineteen of the commercial high-temperature alloys with respect to changes in room-temperature physical properties and scaling rate in cracked-ammonia atmospheres at elevated temperatures is described. Physical-property changes are shown to be essentially independent of variations in composition of the cracked-ammonia atmosphere, are not caused by intergranular attack, and are related only to structural changes resulting from purely thermal effects. Scaling rates are characteristic of the alloy and are dependent upon the moisture content of the atmosphere. (auth)

6288 BMI-272
Battelle Memorial Inst., Columbus, Ohio.
THE IDENTIFICATION AND DISTRIBUTION OF INCLUSIONS IN DERBY AND INGOT URANIUM. C. M. Schwartz and D. A. Vaughan. Aug. 31, 1953. Decl. Dec. 10, 1955. 26p. Contract AT(30-1)-Gen-228. $0.20(OTS).

Inclusions in derby and ingot uranium have been identified by x-ray diffraction methods. Metallographic and microradiographic examinations have shown that inclusions of MgF_2, UO_2, UN, and UO are concentrated at the top of derby and ingot metal by gravity separation. UC inclusions are distributed throughout the ingot metal. The amount of the carbide phase in the ingot varies with the temperature maintained during remelt of derby metal. (auth)

6289 BMI-730
Battelle Memorial Inst., Columbus, Ohio.
THE CONSTITUTION DIAGRAM OF MOLYBDENUM-RICH URANIUM—MOLYBDENUM ALLOYS. H. A. Saller, F. A. Rough, and D. C. Bennett. Mar. 6, 1952. Decl. Dec. 10, 1955. 17p. Contract W-7405-eng-92. $0.15 (OTS).

Uranium–molybdenum alloys containing 50 to 100 at.% Mo were studied. The results of this work are reported, along with a review of the results of work on alloys from 0 to 50 at.%. The principal feature of high-Mo alloys covered in this report is the limited solubility of U in Mo. Data indicate that about 1.8 at.% of U is soluble at 1200°C. (auth)

6290 BMI-809
Battelle Memorial Inst., Columbus, Ohio.
ELECTROPLATING ON ZIRCONIUM USING REPLACEMENT INDIUM DEPOSITS. W. C. Schickner, J. G. Beach, and C. L. Faust. Feb. 2, 1953. Decl. Dec. 9, 1955. 16p. Contract W-7405-eng-92. $0.15(OTS).

Nickel plated on replacement-In-coated Zr has as-plated adhesion of 18,000-psi modulus of rupture. The bond strength is better than the 6,000 psi for as-plated adhesion of Ni on etched Zr, but is inferior to the 50,000-psi alloy-bonded Ni (by heat treatment) on etched Zr. H overvoltages of Zr and other metals are given. (auth)

6291 BMI-869
Battelle Memorial Inst., Columbus, Ohio.
TRANSFORMATION KINETICS OF EUTECTIC URANIUM–CHROMIUM ALLOY. H. A. Saller, F. A. Rough, and A. A. Bauer. Sept. 23, 1953. Decl. Nov. 29, 1955. 19p. Contract W-7405-eng-92. $0.20(OTS).

Uranium and eutectic uranium–chromium (5.2 wt % chromium) alloy have been studied during heating at rates up to 650 and 780 C/sec, respectively. It is apparent that no appreciable effect on the transformation temperatures of either the uranium or the alloy is produced by heating at these rates. The effect of ternary-iron additions to the alloy has been studied briefly, and the times for isothermal transformation of the binary alloy during quenching from 710 C to 450 to 600 C have been determined. (auth)

6292 CF-55-6-13
Oak Ridge National Lab., Tenn.
IRRADIATION EXPERIMENT ON URANIUM DIOXIDE–ALUMINUM POWDER FUEL PLATES. IRRADIATION REQUEST ORNL-22. R. J. Beaver. June 1, 1955. Decl. Jan. 4, 1956. 6p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

It was desired that the irradiation behavior of UO_2 – Al powder fuel elements be evaluated under high burn-up conditions. Two modified MTR test elements of UO_2 – Al powder are described. It was proposed that the elements be irradiated in the MTR for 6 and 12 weeks. (C.H.)

6293 CT-751
[Chicago. Univ. Metallurgical Lab.]
TECHNOLOGICAL RESEARCH— METALLURGY. A. PART II OF REPORT FOR MONTH ENDING JUNE 24, 1943. Decl. Dec. 13, 1955. 15p. $3.30(ph OTS); $2.40 (mf OTS).

Uranium–carbon alloys with C contents ranging from 0.174 to 8.54% have been prepared by sintering pressed blocks made from mixtures of powdered U metal and C. The low C specimens show carbide inclusions embedded in an eutectic matrix. These inclusions have been identified as the monocarbide by chemical and x-ray methods. By x-ray studies the carbide U_2C_3 has been shown to consist of UC and UC_2. The thermocouple assembly used for obtaining cooling curves for U–C alloys has been checked against the melting point of pure Cu as a means of standardization within that temperature range. Reductions of UBr_4 by means of an alkaline earth metal to prepare massive U have been carried out. A rather general survey of the U–Al system has been made in order to obtain information which might be of possible value to the Ames Chemical group. (auth)

6294 HKF-5
Ferguson (H. K.) Co., Inc., New York.
PRODUCTION OF FINNED ALUMINUM TUBING FOR BROOKHAVEN NATIONAL LABORATORY. F. R. Kemmer and P. Miller. May 15, 1949. Decl. Dec. 8, 1955. 52p. For Brookhaven National Lab. Contract AT-30-2-Gen-16, AEM S-26. $9.30(ph OTS); $3.60(mf OTS).

The manufacture of finned Al tubing for use as containers for U slugs in the Brookhaven Reactor is described. The anodizing of the fabricated Al cartridges is also described. (C.H.)

6295 HW-12326
Hanford Works, Richland, Wash.
STAINLESS STEEL ARGON-SHIELDED ARC WELD TESTS. R. L. Heckman. Mar. 17, 1949. Decl. Dec. 22, 1955. 25p. Contract [W-31-109-eng-52]. $0.25(OTS).

The difficulties encountered when welding small diameter stainless steel tubing by the conventional flux-coated metallic arc method have indicated the necessity for finding some other welding method for use in the fabrication of this material. The inherent characteristics of the inert-gas-shielded arc method of welding offer a solution to these problems. Thirty samples of plate and tubing were welded for tests using the argon-shielded arc process. Various sizes of parent material and various types of filler material were used. All samples were corrosion tested and were given critical visual and microscopic examination. Results indicate that welds made by this process are similar to welds made with conventional processes with respect to corrosion resistance and mechanical properties. With respect to other properties, the argon-arc welds seem to be superior. (B.J.H.)

6296 LA-68
[Los Alamos Scientific Lab., N. Mex.]
URANIUM ALLOY DEVELOPMENT, PART IV. A. U. Seybolt, L. B. Stark, W. F. Arnold, and F. J. Schnettler. Feb. 15, 1944. Decl. Dec. 14, 1955. 30p. Contract [W-7405-eng-36]. $4.80(ph OTS); $2.70(mf OTS).

Analyses are given of the bottom-poured U-Mo alloys mentioned in LA-55, and show practically no segregation. Compression stress-strain tests have been made on unalloyed U castings and on extruded bar. The results show no significant difference between these two types of material, the 0.2% off-set yield strength being about 31,000 lbs/sq in., and the moduli of elasticity ranging from 19,000,000 lbs/sq in. to 25,000,000, with most of the values falling close to 22,000,000. Alloys of U with Ti, Zr, Cr, Nb, Ni, and Pt at 2 atomic % concentrations in each case were made in 200 gram lots. Nb had little effect on the hardness. Cr, Ni, and Pt increased the hardness considerably, and in the cases of Cr and Pt, X-ray diffraction films showed structures different from the low temperature modification of U. Microphotographs of the structures are given. One gram alloys of U with V, Au, Pd, Os, Ru, Ir, Re, Rh, and Ga were made to test the techniques for making and studying such small samples and to make alloys with new elements. The alloys of all of these elements at 2 atomic % showed appreciably greater hardness than U. The alloys with Pd, Os, Ru, Rh, and Ga appeared to contain two phases (besides a little carbide). X-ray diffraction patterns of the Ir and Re alloys showed the new structure previously found in the Cr and Pt alloys. Present interpretation is that these alloys contain a higher temperature modification of U, the hard brittle nature of the alloys further suggesting that this is the beta phase which in pure U is stable between 660 and 770°C. Microphotographs of these alloys are given. (auth)

6297 LAMS-315
[Los Alamos Scientific Lab., N. Mex.]
HEAT TREATMENT AND MACHINABILITY OF BERYLLIUM ROD. P. C. Nothaft and G. L. Kehl. Feb. 19, 1946. Decl. Dec. 7, 1955. 16p. Contract [W-7405-eng-36]. $3.30(ph OTS); $2.40(mf OTS).

Earlier machining results on ¼-in. Be rod that had been heat treated indicated that it would be beneficial to alter the structure from the "as extruded" to one that was equiaxed. This did not follow for the 1¼-in. Wolverine Rod. Whether this is due to the difference in cross section, or difference in extrusion practice was not known. (auth)

6298 M-2498
Massachusetts Inst. of Tech., Cambridge. Metallurgical Group.
PROGRESS REPORT OF METALLURGICAL GROUP AT MIT. Albert R. Kaufmann. May 22, 1943. Decl. Jan. 10, 1956. 27p. $4.80(ph OTS); $2.70(mf OTS).

6299 MIT-1018(Pt.1)
Massachusetts Inst. of Tech., Cambridge.
METALLURGICAL PROJECT TECHNICAL PROGRESS REPORT FOR THE PERIOD SEPTEMBER THROUGH DECEMBER 1948. May 6, 1949. Decl. Jan. 27, 1956. 69p. $16.80(ph OTS); $5.70(mf OTS).

6300 MIT-1034(Pt. II)
Massachusetts Inst. of Tech., Cambridge. [Metallurgical Project].
TECHNICAL PROGRESS REPORT FOR THE PERIOD JULY THROUGH SEPTEMBER 1949. A. R. Kaufmann. Oct. 26, 1949. Decl. Jan. 17, 1956. 4p. $1.80(ph OTS); $1.80(mf OTS).

6301 MIT-1058
Massachusetts Inst. of Tech., Cambridge. Metallurgical Project.
TECHNICAL PROGRESS REPORT FOR THE PERIOD JULY THROUGH SEPTEMBER 1950. Feb. 8, 1951. Decl. Jan. 12, 1956. 114p. Contract AT(30-1)-981. $18.30(ph OTS); $6.00(mf OTS).

Preliminary results indicate that the orientation of Be crystals may be roughly determined by polarized light examination of a polished surface. Zirconium may be successfully melted using the autocrucible process in a water-cooled Cu shell, and Zr with 4% U may be melted in an inductively heated graphite crucible. Drip-melted Bureau of Mines Zr shows as good corrosion resistance as crystal bar after 3000 hrs in 600°F water. Oxygen has no harmful effects on the corrosion resistance of Zr, and 6% Sn in Zr leads to a corrosion-resistant alloy. Gd_2O_2 mixed with Zr is not corrosion resistant. Titanium tubing has been successfully extruded and cold drawn. Ni–Mn alloys were prepared and their electrical resistivity and magnetic susceptibility determined. (F.S.)

6302 ORNL-473
Oak Ridge National Lab., Tenn.
THERMAL CYCLING OF A FUEL ASSEMBLY. H. C. Savage and F. Drosten. Sept. 29, 1949. Decl. Jan. 30, 1956. 10p. Contract W-7405-eng-26. $1.80(ph OTS): $1.80(mf OTS).

In a thermal cycling experiment on an Al-clad uranium – aluminum alloy core plate assembly, the dimensional stability showed no appreciable changes in dimensions, warping or blistering after 3925 cycles from ~17°C to ~100°C. (F.S.)

6303 SEP-6
Sylvania Electric Products Inc. Metallurgical Labs., Bayside, N. Y.
THE DEVELOPMENT OF UNIFORM DISTRIBUTIONS OF URANIUM IN BERYLLIUM BY MEANS OF POWDER METALLURGY. R. P. Angier and H. H. Hausner. Oct. 29, 1948. Decl. Dec. 8, 1955. 18p. Contract AT-30-1-Gen-366. $0.20(OTS).

Investigations were made to determine the possible use of powder metallurgy for the development of uniform distribution of uranium in a beryllium matrix. Tests have shown that during a three hour sintering at 1235°C in a vacuum of 0.5μ Hg an alloying reaction results in the formation of the intermetallic compound UBe_9. The same compound was further prepared by vacuum melting. Powders made from these two types of UBe_9 were compacted and sintered. The good pressing qualities of the sinter-prepared UBe_9 powder and the greater densities of the compact obtained with this type of powder showed the superiority of the sinter-prepared UBe_9. Results indicate that the character of the uniformity will be either a crystallographic distribution of uranium in the intermetallic compound UBe_9 or, in the case of lesser uranium content, a uniform dispersion of UBe_9 particles in a matrix of sintered beryllium particles. A high degree of uniform distribution can be obtained by the powder metallurgical production of sintered compacts containing UBe_9 in a Be matrix. (auth)

6304 SEP-85
Sylvania Electric Products Inc., Bayside, N. Y.
THE POWDER METALLURGY OF ZIRCONIUM–TIN ALLOYS (PART I). Henry H. Hausner and Richard M. Treco. Feb. 1, 1952. Decl. Dec. 6, 1955. 21p. Contract AT-30-1-GEN-366. $0.20(OTS).

An exploratory investigation was made of the feasibility of manufacturing zirconium–tin alloys by powder metallurgical methods. Several series of zirconium-rich alloys were prepared from commercial grade tin powder and ZrH_2 powder made from Grade III crystal bar, ZrH_2 powder made from Grade I crystal bar, or ZrH_2 powder made from Grade C Bureau of Mines zirconium sponge. The corrosion rates and other physical properties of the various alloys are given and the results from crystal bar zirconium were compared with those from zirconium sponge. A brief study was also made of resistance-sintering of zirconium–tin alloys made from zirconium-sponge hydride powder and tin powder. (auth)

6305 UCRL-1094
California. Univ., Berkeley. Radiation Lab.
THE EFFECT OF GASES ON THE WETTING OF STEELS BY LIQUID BISMUTH. R. A. Heckman. Jan. 17, 1951. Decl. Jan. 27, 1956. 22p. Contract [W-7405-eng-48]. $4.80(ph OTS); $2.70(mf OTS).

The effect of air, N_2, He, A, and a mixture of twenty volume percent of H_2 in A on the wetting of a stainless steel (Type 446), a 2% Cr–½% Mo steel, and a plain carbon type steel by liquid Bi was investigated. Irreversible wetting may be obtained by preheating the steel to 1500°F in a He atmosphere and then immersing into molten Bi at 1000°F. Reversible wetting (i.e., de-wetting takes place) may be obtained by preheating the steel to 1500°F in an A atmosphere and then immersing into liquid Bi. (auth)

6306 Y-645
Oak Ridge National Lab., Y-12 Area, Tenn.
HAFNIUM METAL–II. REDUCTION OF HAFNIUM TETRAFLUORIDE TO HAFNIUM METAL. P. J. Hagelston, R. O. Hutchison, and F. J. Lambert. Aug. 30, 1950. Decl. Jan. 7, 1956. 10p. Contract W-7405-eng-26. $0.15(OTS).

The reduction of HfF_4 to Hf using Ca and I_2 as the reductant and heat booster, respectively, is described. Typical analyses of the Hf obtained are reported. (CWH)

Refer also to abstracts 6241 and 6259.

PHYSICS

6307 AECD-4009
National Bureau of Standards, Washington, D. C.
NATIONAL BUREAU OF STANDARDS PROGRESS REPORT TO THE ATOMIC ENERGY COMMISSION JULY 1, 1950 TO SEPTEMBER 30, 1950. Decl. Jan. 12, 1956. 31p. (NBS-P-28). $4.80(ph OTS); $2.70(mf OTS).

Progress is reported on the development of a Zamboni-type pile to furnish d-c sources of high voltage for radiation detection elements, radiation detection instrumentation, the synthesis of isotopically labeled sugars and related compounds, heat capacities of Na–K alloys, determination of isotope ratios in U, the determination of Be in U, stored energy in irradiated graphite, diamond, beryllia, and silicon carbide, and equilibrium diagrams of U–Be and U–Ti alloys. (B.J.H.)

6308 CF-51-5-193
Oak Ridge National Lab., Tenn.
CORRELATION OF MASS TRANSFER DATA FROM LINDE AIR PRODUCTS COMPANY ON THE ADSORPTION OF KRYPTON ON ACTIVATED CHARCOAL. J. M. Holmes. May 29, 1951. Decl. Dec. 20, 1955. 14p. Contract [W-7405-eng-26]. $0.70(OTS).

6309 NAA-SR-13
North American Aviation, Inc., Los Angeles.
TECHNIQUE OF RESISTIVITY MEASUREMENTS ON CYCLOTRON BOMBARDED GRAPHITE. F. R. Gilmore, C. R. Malmstrom, and A. A. Jarrett. Apr. 4, 1949. Decl. Dec. 5, 1955. Contract AT-11-1-Gen-8. $0.20(OTS).

A refined experimental procedure is presented for measuring resistivity changes in graphite layers 0.001-in. thick with an accuracy of ~5%. (L.M.T.)

6310 NBS-D-128
National Bureau of Standards, Washington, D. C.
QUARTERLY PROGRESS REPORT FOR JANUARY, FEBRUARY, AND MARCH 1954. Sept. 1954. Decl. Jan.

11, 1956. 54p. $7.80(ph OTS); $3.30(mf OTS).

The neutron production threshold for Al^{27} bombarded with x rays is 13.18 ± 0.3 Mev, and the positron production threshold is 1.28 ± 0.4 Mev higher. A high-energy x-ray image intensifier which continuously reproduces the low-intensity x-ray picture formed by high-energy x rays which have penetrated a thick absorber is being tested. Diethyl ether solutions containing dissolved beryllium chloride etherate or Be dimethyl were studied with respect to miscibility with other solvents and electrolytic properties of the resulting solution. The reaction between beryllium chloride etherate and $LiAlH_4$ in diethyl ether was studied. Be–Al alloys were electrodeposited from etherate solution. A number of aromatic compounds and perfluoro-aromatics having high thermal stability were prepared. Phase studies were made of Au–U and U–Pt alloys. Some preliminary experiments in the production of dense UO_2 specimens are described, and data are presented showing the effects of small additions of various oxides. X-ray patterns are presented showing the monoclinic-tetragonal inversion of ZrO_2. The solidus temperature in the UO_2–Al_2O_3 system was tentatively located at 1915 ± 10°C. Preliminary results were obtained for the apparent density of pure ThO_2 bodies. (J.E.D.)

6311 ORNL-1712

Oak Ridge National Lab., Tenn.

THE OPTICAL PROPERTIES OF SOME INORGANIC FLUORIDE AND CHLORIDE COMPOUNDS. T. N. McVay and G. D. White. May 24, 1954. Decl. Dec. 7, 1955. 8p. Contract W-7405-eng-26. $0.15(OTS).

Optical properties are listed for various inorganic fluoride and chloride compounds. (auth)

CRYSTALLOGRAPHY AND CRYSTAL STRUCTURE

6312 CN-1457

Chicago. Univ. Metallurgical Lab.

CRYSTAL STRUCTURE OF HEXAGONAL BISMUTH PHOSPHATE. R. C. L. Mooney. Mar. 6, 1944. Decl. Feb. 2, 1956. 9p. (A-2044). $1.80(ph OTS); $1.80(mf OTS).

The complete structure of hexagonal $BiPO_4$ determined from single crystal and powder x-ray data. There are three molecules of $BiPO_4$ in a cell of dimensions: a = 6.958 ± .010; c = 6.466 ± .010 A. U. The density calculated from these data is 5.552 gm/cm³. The space group is D_3^4-$C3_121$ (Enantiamorphic with D_3^6). Bismuth and P are in three-fold special positions on rotation axes, and oxygens are distributed in two sets of general positions of the space group. The eight parameters required to describe the structure were found. The Bi is coordinated to eight oxygens; four at distances of 2.28 A.U. (tetrahedron corners) and four at 2.66 A.U. (two tetrahedron edges). The closest O_2-to-O_2 distance is 2.72. The structure is an open framework type, having channels running along the hexagonal axes. (auth)

Refer also to abstract 6448.

GASES

6313 AECD-4197

Hanford Works, Richland, Wash.

CALCULATED THERMAL CONDUCTIVITIES OF PURE GASES AND GASEOUS MIXTURES AT ELEVATED TEMPERATURES. J. M. Wright. July 18, 1951. Decl. with deletions Dec. 2, 1955. 15p. Contract W-31-109-eng-52. $3.30(ph OTS); $2.40(mf OTS).

A method of calculating thermal conductivities of gases and mixtures of gases at elevated temperatures is presented. Results for CO_2, He, Ne, N_2 and their binary mixtures are given for the temperature range of 273 to 800°K. The calculated results for the pure gases are in agreement with the known experimental data. (auth)

6314 ORO-118

Linde Air Products Co. Tonawanda Lab., Tonawanda, N. Y.

ADSORPTION OF KRYPTON AND XENON. J. N. Burdick. Nov. 5, 1951. Decl. Jan. 11, 1956. 31p. Contract AT(40-1)-1093. (CF-51-11-5(Tonawanda)). Charge $6.30(ph OTS); $3.00(mf OTS).

The adsorption isotherms of Kr and Xe on carbon and silica gel were measured at temperatures in the range –183 to –120°C in static and dynamic systems. Results indicate that either gas can be completely adsorbed from N_2 at temperatures of –150°C and below with a simple fixed bed of activated carbon. (C.W.H.)

INSTRUMENTS

6315 A-3624

Carbide and Carbon Chemicals Corp., Oak Ridge, Tenn.

STABLE ION GAGE CIRCUIT. J. Townsend. Jan. 31, 1946. Decl. Jan. 17, 1956. 10p. $1.80(ph OTS); $1.80 (mf OTS).

A description of a simple bridge circuit which may be used with an ionization gage is given. Neither automatic nor manual regulation of the emission current of the ionization gage tube is necessary with this circuit. (auth)

6316 AECD-4119

Tennessee Eastman Corp., Oak Ridge, Tenn.

QUANTITATIVE ANALYSIS BY X-RAY SPECTROSCOPY FOR SMALL AMOUNTS OF T. R. L. Hudson and L. E. Burkhart. July 20, 1945. Decl. Feb. 2, 1956. 21p. Contract W-7401-eng-23. (C-0.360.1). $4.80(ph OTS); $2.70 (mf OTS).

An x-ray spectrograph with tube, vacuum system and power supply was developed and tested for its lower limit of sensitivity in the analysis of U. It was found to have a sensitivity between 1 and .2 parts per thousand. (F.S.)

6317 AECD-4121

Tennessee Eastman Corp., Oak Ridge, Tenn.

A THERMAL TYPE FLOW METER FOR LOW RATES OF ANHYDROUS HYDROFLUORIC ACID. K. O. Johnson, W. F. Peed, and G. H. Clewett. June 24, 1946. Decl. Feb. 2, 1956. 19p. Contract W-7401-eng-23. (C-5.355.8). $3.30 (ph OTS); $2.40(mf OTS).

A thermal-type flowmeter has been adapted for use in metering anhydrous HF. This meter is particularly suitable for low flow rates and for corrosive gases that cannot be handled in standard type rotameters or orifice meters. Meters have been constructed with flow ranges from 0.3 grams/min to 0.30 grams/min of anhydrous HF. (auth)

6318 K-106

Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.

MODIFICATIONS IN COMPOUND TEN COUPLE COPPER–CONSTANTAN THERMOPILE USED FOR DETERMINATION OF HYDROGEN FLUORIDE IN URANIUM HEXAFLUORIDE. J. LaGraff. Dec. 26, 1947. Decl. Nov. 28, 1955. 11p. Contract [W-7405-eng-26]. $0.15(OTS).

Several changes are described which have been made in the construction of ten couple, copper-constantan thermopiles used for determining the amount of HF in UF_6 by the freezing point depression method. These changes were the use of large copper wire, the use of a resin coating or a machined plastic tip for insulating the junctions, and a dif-

ferent method of attaching the leads to the thermopile. (auth)

6319 K-136

Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.

METAL SPECTROMETER TUBE FOR THE LINE RECORDER. V. H. Kiplinger. Feb. 12, 1948. Decl. Feb. 8, 1956. 16p. $3.30(ph OTS); $2.40(mf OTS).

A metal Line Recorder tube was developed to replace the present glass tubes. This change was recommended because of reduced maintenance costs. The metal tube, when used in conjunction with the metal diffusion pump and trap, should eliminate glass breakage, facilitate source changes and greatly reduce off-stream rack time. (auth)

6320 K-342

Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn.

A METAL MERCURY DIFFUSION PUMP AND COLD TRAP FOR THE LINE RECORDER. J. T. Dalton. June 10, 1949. Decl. Dec. 27, 1955. 31p. Contract [W-7405-eng-26]. $0.25(OTS).

This report describes a stainless steel Hg diffusion pump and cold trap designed for use in the Mass Spectrometer (Line Recorder) tube rack. Two refrigerant reservoirs are discussed, one for use with liquid N_2, the other for installation with a mechanical refrigeration system. Curves and tables showing the results of tests on trial models as well as production models of the final design are included. Operation and physical specifications for the unit are included. (auth)

6321 KAPL-104

Knolls Atomic Power Lab., Schenectady, N. Y.

WATER SEAL FOR STIRRERS USED IN MIXER-SETTLER TYPE EXTRACTOR. J. R. Gould. Nov. 1, 1948. Decl. Jan. 30, 1956. 7p. Contract W-31-109-Eng-52. $1.80 (ph OTS); $1.80(mf OTS).

A water seal was developed to prevent vapor leakage out of the mixer shaft standpipes of a horizontal mixer-settler type extractor. It was found to operate satisfactorily within the limits specified. (B.J.H.)

6322 NAA-SR-158

North American Aviation, Inc., Downey, Calif.

RADIATION AND HEAT RESISTANT VACUUM SEALS. N. S. Rasor and J. M. Nuding. Dec. 18, 1951. Decl. Dec. 5, 1955. 29p. Contract AT-11-1-GEN-8. $0.25(OTS).

A vacuum seal utilizing an inflatable sheet metal gasket has been developed for applications in which high intensity nuclear radiation or high temperature make the use of conventional sealing materials and techniques unsatisfactory. A test model of this seal is described and a possible mechanism to explain its observed performance is proposed. The application of this seal and its modifications is discussed with a view toward its suitability for use in the MTA Mark III accelerator. Alternative seals also considered include a gasket of an alloy of gold and cadmium having unusual elastic properties, and a multiple pump-out arrangement employing no gasket. (auth)

6323 Y-705

Oak Ridge National Lab., Tenn.

HIGH TEMPERATURE ION SOURCE AND THERMOHM DEVELOPMENT FOR STABLE ISOTOPE PRODUCTION. P. E. Wilkinson and G. D. Whitman. Dec. 5, 1950. Decl. Jan. 6, 1956. 17p. Contract W-7405-eng-26. $0.20 (OTS).

Designs are given for a calutron ion source using graphite heating elements and a thermohm for operation from 650 to 1000°C. (B.J.H.)

ISOTOPE SEPARATION

6324 AECD-4079

Tennessee Eastman Corp., Oak Ridge, Tenn.

EFFECTS OF RECEIVER SLOTS ON QUANTITY AND QUALITY OF PRODUCT AND RECYCLE. Benjamin Harmatz. May 29, 1947. Decl. Jan. 17, 1956. 12p. (A-6.410.8). $4.80(ph OTS); $2.70(mf OTS).

6325 AECD-4122

Tennessee Eastman Corp., Oak Ridge, Tenn.

A MATHEMATICAL ANALYSIS OF THE CALUTRON PROCESS. C. E. Leith. Apr. 12, 1946. Decl. Feb. 2, 1956. 31p. Contract W-7401-eng-23. (D-4.490.1). $6.30 (ph OTS); $3.00(mf OTS).

The definitions of the fundamental measures of calutron operation including enhancement, current ratio, and process efficiency are set forth with derivations of the relationships between them. An analysis of the plant process is carried out for both the tanks limited and the charge limited case. Equations are derived for plant X output and plant X utilization efficiency. Effective production is defined and the value of increment to a mass of product material in terms of effective production is determined. An equation giving the X concentration below which product material should be reprocessed is derived. (auth)

6326 Y-550

Carbide and Carbon Chemicals Div. Y-12 Plant, Oak Ridge, Tenn.

Y-12 RESEARCH LABORATORY PROGRESS REPORT [FOR] OCTOBER 1, 1949 TO DECEMBER 31, 1949. PART II. ISOTOPE RESEARCH AND PRODUCTION DIVISION. Jan. 1, 1950. Decl. Jan. 16, 1956. 148p. Contract W-7405-eng-26. $22.80(ph OTS); $7.20(mf OTS).

Research was done on calutron operations and experiments continued on source, receiver and filament improvement. Charge materials of Se, Mg, Ag, Si, La, Sn, Zr, Li, and Sr were prepared. Refinements of isotopes of Fe, K, Cu, Li, Ce, Se, S, Hg, Be, Ag, and B were completed. Spectroscopic analysis of Pu, Zr, and U^{235} were made and work was done on the application of microwaves to the isotopic analysis of N. Metallurgical problems of Zr, Cu, Li–U alloys and the corrosion of graphite were studied during the period 10/1/49 to 12/31/49. (F.S.)

6327 Y-565

Oak Ridge National Lab. Y-12 Area, Tenn.

SUMMARY OF STABLE ISOTOPE PRODUCTION AND CHEMISTRY PROCEDURES. H. W. Savage and Boyd Weaver. Feb. 17, 1950. Decl. Dec. 7, 1955. 29p. Contract W-7405-eng-26. $0.25(OTS).

Operational and chemical procedures used at ORNL are briefly described. Information is listed showing charge materials used, primary calutron problems, collector pocket material, and chemical refinement methods. (auth)

6328 Y-653

Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.

ALPHA II CALUTRON DEVELOPMENT, 1948. R. S. Livingston and F. H. Neill. July 1, 1949. Decl. Jan. 30, 1956. 150p. Contract W-7405-eng-26. $22.80(ph OTS); $7.20(mf OTS).

A comprehensive and detailed review is given of the Alpha calutron design. The report is directed particularly toward the re-evaluation of this unit as a production method for isotope separation. (K.S.)

6329 Y-777

Oak Ridge National Lab., Tenn.

AN INVESTIGATION OF THE ACTIVATED CELLULOSE COLUMN AS AN ISOTOPE SEPARATION DEVICE. John S. Drury. June 8, 1951. Decl. Jan. 6, 1956. 13p. Con-

tract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

An investigation was made to determine whether a significant isotope partition could be observed by eluting certain lithium compounds through a column packed with treated cellulose. No significant change was found in the isotopic ratio of the leading edges of five runs made under various conditions. (auth)

MASS SPECTROGRAPHY

6330 AECD-4078
Tennessee Eastman Corp., Oak Ridge, Tenn.
IMPROVED HIGH VOLTAGE SUPPLY AND CONTROL PANEL FOR THE NIER MASS SPECTROMETER. J. R. White and A. E. Cameron. [nd]. Decl. Jan. 18, 1956. 21p. (B-6.460.1). $4.80(ph OTS); $2.70(mf OTS).

The recurrent difficulties experienced in routine operation of the high voltage supplies and main control panels of the standard assay instruments are indicated. New supply and distribution units, which were designed to avoid these difficulties, have been constructed and tested. This report briefly describes these units and presents a more detailed description of a high current power supply and main control panel. (auth)

6331 K-720
Carbide and Carbon Chemicals Div. K-25 Plant, Oak Ridge, Tenn.
A LINE RECORDER FOR NITROGEN–HELIUM ANALYSIS. W. C. Taylor. Jan. 31, 1951. Decl. Jan. 3, 1956. 11p. Contract W-7405-eng-26. $0.15(OTS).

Alterations were made in a standard line recorder to facilitate the measurement of He and N samples. The magnetic field was reduced from 3250 to 1745 gauss, the collector slit width was increased, the source slit decreased, and the inlet section of the mass spectrometer redesigned. (D.E.B.)

6332 KLX-1393
Vitro Corp. of America, New York.
MASS SPECTROMETER DEVELOPMENT. JOB 24-B2. Final Project Status Report for July 1, 1952 – June 30, 1953. July 15, 1953. Decl. Dec. 5, 1955. 31p. Contract AT(30-1)-850. $0.25(OTS).

The program status and results of work on the solid-sampling mass spectrometer during the period July 1, 1952 to June 30, 1953 are described. The instrument has demonstrated its potential ability to resolve masses ranging from below Na to above U in a continuous sample analysis. Experimental work has demonstrated that solid samples can be introduced, ionized and made ready for sampling in a matter of minutes. Several design changes to improve operation and facilitate analysis have been studied and are recommended. (auth)

6333 Y-453
Carbide and Carbon Chemicals Corp. Y-12 Plant, Oak Ridge, Tenn.
ASSAY LABORATORY DEPARTMENT PROCESS IMPROVEMENT REPORT [FOR] SECOND QUARTER, 1949. July 1, 1949. Decl. Jan. 27, 1956. 16p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

Mass spectrographic studies and the development of new equipment to improve process efficiency are discussed. Some data are presented on the effect of spectrometer variables on measuring H–D ratios. (K.S.)

MATHEMATICS

6334 AECD-4056
[Tennessee Eastman Corp., Oak Ridge, Tenn.]
METHOD OF DETERMINING SOLID ANGLES. (Applicable to Critical Mass Studies). Raymond Murray and George W. Schmidt. Nov. 25, 1946. Decl. Jan. 18, 1956. 14p. (A-7.390.16). $3.30(ph OTS); $2.40(mf OTS).

A compilation of formulas for accurate solid angle calculations in critical conditions (mass, dimensions, or concentration of fissionable materials) is presented for three cases: (1) point to rectangle; (2) point to disc; and (3) cylinder to cylinder. (L.M.T.)

6335 ORNL-516
Oak Ridge National Lab., Tenn.
MATHEMATICS PANEL QUARTERLY PROGRESS REPORT FOR THE PERIOD ENDING OCTOBER 31, 1949. Dec. 12, 1949. Decl. Feb. 14, 1956. 17p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

Discussions are given of problems, including yeast genetics, the fitting of exponential decay curves, the significance of difference, and sample solutions of an eigenvalue problem, curve fitting by the method of least squares, and others. (B.J.H.)

6336 ORNL-634
Oak Ridge National Lab., Tenn.
MATHEMATICS PANEL QUARTERLY PROGRESS REPORT FOR THE PERIOD ENDING JANUARY 31, 1950. Mar. 10, 1950. Decl. Jan. 30, 1956. 25p. Contract W-7405-eng-26. $4.80(ph OTS); $2.70(mf OTS).

MEASURING INSTRUMENTS AND TECHNIQUES

6337 AECD-4082
Tennessee Eastman Corp., Oak Ridge, Tenn.
PROCESS MONITOR ANALYSIS VICTOREEN MODEL 350. J. A. Harter and E. L. Olson. May 1, 1947. Decl. Jan. 18, 1956. 28p. (A-6.465.1). $4.80(ph OTS); $2.70(mf OTS).

An analysis of the improved Victoreen Model Number 350 Process Monitor was made. The results of the tests indicated the possibility of marked improvement in the monitor characteristics with minor redesigns. After these improvements have been made, this instrument will be a satisfactory monitor for use in production areas. (auth)

6338 KAPL-429
Knolls Atomic Power Lab., Schenectady, N. Y.
AN ALPHA COUNTER FOR FOIL SCANNING AND RANGE MEASUREMENTS. F. A. White, J. C. Sheffield, and T. L. Collins. Nov. 28, 1950. Decl. Dec. 6, 1955. 11p. Contract W-31-109-eng-52. $0.15(OTS).

The counter is unique in that it is possible to move the sample within the chamber at any pressure between 1 atm and vacuum. A detailed view of the instrument is shown. The alpha counter comprises four unit; a base for containing sample foils, a low-geometry head in which range determinations may be made, a high-geometry head, and a preamplifier. A photograph showing the assembled instrument utilizing the low-geometry chamber with attached preamplifier is given. (auth)

6339 LA-1551
Los Alamos Scientific Lab., N. Mex.
A PROBE-TYPE ALPHA DETECTOR FOR THE MEASUREMENT OF POLONIUM SOLUTIONS. Angelo L. Giorgi, Melvin G. Bowman, George N. Rupert, and Dwayne T. Vier. Mar. 1953. Decl. Dec. 12, 1955. 16p. Contract W-7405-eng-36. $0.20(OTS).

The construction and operational use of an immersion, probe-type alpha detector designed to permit direct determinations of the concentration of polonium in solution are described. Using polonium solutions of known concentrations, range factors for the various ranges of the electrometer amplifier were determined, as well as the response of the amplifier versus polonium concentrations over a complete range. Results indicate that the probe and electrom-

eter have a linear response and will give reproducible values which are in error by only ±5%. The outstanding features of the probe-type ionization chamber are the simple construction, the ease of operation, and the fact that it gives an immediate and continuous indication of the levels of alpha activity in solution. It is an effective instrument for the analysis of polonium in solution. It is believed that the instrument described will prove to be very useful in a variety of problems involving solutions containing alpha emitters. If the probe construction were modified (perhaps a glass probe to which a mica window is attached by the use of powdered glass flux) the instrument could be adapted for use with organic solutions. (auth)

6340 MTA-50
California Research and Development Co. Livermore Research Lab., Livermore, Calif.
A SPOT-SENSITIVE HIGH ENERGY BEAM MONITOR. S. Siegel. May 7, 1953. Decl. Dec. 6, 1955. 16p. Contract AT(11-1)-74. $0.20(OTS).

An instrument is described which can be used to measure the beam intensity at different points within a large high energy nuclear beam. A small collimated portion of the beam is allowed to impinge on the end of a heat conducting rod and the thermal gradient measured along this rod is proportional to the entering current. Measurements can be made over areas as small as a one sixteenth of an inch diameter circular hole. The instrument was tested in the experimental ion source at Livermore using a 50 kv proton beam. Beam profiles are given for 120 and 85 ma beams. A more efficient design is also described which may be used to determine beam profiles in high energy linear accelerators. (auth)

Refer also to abstract 6418.

MOLECULAR PROPERTIES

6341 K-979
Carbide and Carbon Chemicals Co. K-25 Plant, Oak Ridge, Tenn.
THE VAPOR PRESSURE OF A MIXTURE OF H_2O AND D_2O. C. F. Hale and George D. Oliver. Nov. 24, 1952. Decl. Jan. 5, 1956. 7p. Contract W-7405-eng-26. $0.15(OTS).

The vapor pressure of a 50-50 mole % mixture (HDO) of H_2O and D_2O and the difference in pressure of H_2O and HDO from 160 to 3143 psia. have been determined by means of a high pressure ebulliometer. A plot of the data shows the vapor pressures of H_2O, D_2O, and HDO to be equal at 220.7°C. and 340.9 psia. The vapor pressure of HDO is an average of that of H_2O and D_2O. (auth)

NEUTRONS

6342 CF-53-3-166
Oak Ridge National Lab., Tenn.
ATTENUATION BY LEAD OF FAST NEUTRONS FROM A FISSION SOURCE. J. D. Flynn and G. T. Chapman. Mar. 10, 1953. Decl. Nov. 30, 1955. 4p. Contract [W-7405-eng-26]. $0.10(OTS).

An experiment was carried out in the Lid Tank to determine the effect of a thick hemisphere of Pb on the actual fast-neutron dose. A 15-in. wide dry tank was inserted in the Lid Tank next to the source, giving effectively an infinite slab of air with the 28-in. diameter fission source on one side and water on the other. The dose was then measured in the water next to this tank. A hemispherical Pb shield 7-in. thick was inserted in the dry tank centered on the source axis, and the dose was remeasured in the same position. The ratio of the two readings indicated the effect of the Pb on fast neutrons arriving from the outside. The γ dose was also measured in the same position with and without the Pb shield. (L.T.W.)

6343 KAPL-1278
Knolls Atomic Power Lab., Schenectady, N. Y.
NUMERICAL SOLUTION OF THE NEUTRON SLOWING-DOWN PROBLEM IN THE PRESENCE OF HYDROGEN. P. F. Zweifel and S. R. Bigelow. Feb. 3, 1955. Decl. Dec. 5, 1955. 28p. Contract W-31-109-eng-52. $0.20 (OTS).

The results of calculations of the age and slowing-down density of neutrons in water and water–metal mixtures are given. Plans for extending these calculations are discussed. (auth)

6344 ORNL-431
Oak Ridge National Lab., Tenn.
ASYMPTOTIC NEUTRON DISTRIBUTION IN A THREE COMPONENT MIXTURE WITH FORWARD HYDROGEN SCATTERING. J. W. Butler. Nov. 22, 1949. Decl. Jan. 9, 1956. 20p. Contract W-7405-eng-26. $0.20(OTS).

Results are presented of an attempt to add to the generality of neutron attenuation problems which can be discussed with the aid of the assumption of straight-ahead scattering by hydrogen. By the use of the Laplace transform and real Tauberian theorems it is found possible to determine the asymptotic space variation of the collision density with quite general energy dependence of the three cross sections involved. Simple bounds are also derived for the asymptotic spectral distribution function. (auth)

NUCLEAR PHYSICS

6345 MonP-8
Clinton National Lab., Oak Ridge, Tenn.
PHYSICS DIVISION REPORT FOR MONTH ENDING AUGUST 31, 1945. L. W. Nordheim. Decl. Jan. 30, 1956. 28p. Contract W-35-058-eng-71. $4.80(ph OTS); $2.70 (mf OTS).

A mathematical analysis was made of the fluctuations in temperature at a point in a moving fluid which is assumed to be heated. This problem arises in connection with the calculation of the fluctuations in power caused by turbulence of the pile fluid. The perturbation theory of reflectors is also discussed. Revised temperature coefficients of the enriched reactor are tabulated. The effectiveness of a Cd curtain around a 60-cm radius, 150-cm-high cylindrical reactor was calculated. Calculations on the thermal utilization of various arrays of myrnaloy rods in graphite and D_2O reflectors were continued. Delayed neutron spectra are shown. The β spectrum of 57-day Ir is given. Development of the pile modulator is discussed. (B.J.H.)

6346 NAA-SR-226
North American Aviation, Inc., Downey, Calif.
PREPARATION OF DAUGHTER-FREE THORIUM FOILS. L. Silverman and K. Trego. Feb. 25, 1953. Decl. Dec. 7, 1955. 20p. Contract AT-11-1-Gen-8. $0.20(OTS).

Daughter-free thorium oxide has been prepared from thorium metal and from nitrate. The technique involves a sequence of electrodeposition, hydrolysis of thorium nitrate and partial precipitation of the thorium as oxalate. The oxalate is then ignited to oxide which is the final product. Procedures are outlined in detail, and the effectiveness of the individual separation steps in purifying the thorium is briefly discussed. A satisfactory method for preparation of foils is to brush a suspension of the oxide, in ethyl acetate-thinned collodion, on a cellulose acetate sheet. (auth)

NUCLEAR PROPERTIES

6347 AECD-4098
North American Aviation, Inc., [Downey, Calif.]
RESONANCE ABSORPTION OF THORIUM. D. H. Martin. Apr. 2, 1953. Decl. Jan. 27, 1956. 9p. Contract [AT-11-1-GEN-8]. (NAA-SR-Memo-651). $1.80(ph OTS); $1.80 (mf OTS).

Cadmium ratios for very thin (neutron and beta-wise) foils of thorium, gold, vanadium and indium have been measured in the glory hole of the WBNS. These cadmium ratios, together with the known thermal cross sections and a given calculated resonance integral for gold, were used to evaluate the resonance integrals of thorium, vanadium and indium. Values obtained were:

Element	Cadmium Ratio	Resonance Integral (barns)
Thorium	1.85	86.4
Vanadium	17.2	1.1
Indium (In^{115})	1.75	2,763

(auth)

6348 CF-54-10-113
Oak Ridge National Lab., Tenn.
RESONANCE CROSS-SECTION DATA FOR Th^{232}, U^{233}, U^{235}, U^{238} REPORTED AT THE OCTOBER 13-15 CLASSIFIED SYMPOSIUM AT OAK RIDGE. Lawrence Dresner. Oct. 26, 1954. Decl. Dec. 15, 1955. 7p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

6349 CF-54-11-3
Oak Ridge National Lab., Tenn.
MEASUREMENT OF AN EFFECTIVE NEUTRON REMOVAL CROSS SECTION OF LITHIUM AT THE LID TANK SHIELDING FACILITY. G. T. Chapman, J. B. Dee, J. M. Miller, and W. McCool. Nov. 2, 1954. Decl. Dec. 20, 1955. 16p. Contract [W-7405-eng-26]. $0.20(OTS).

An effective neutron removal cross section (σ_R) of 1.01 ± 0.04 barns was determined for lithium at the LTSF. This value was obtained from measurements made in a medium of oil behind a slab of metallic lithium which was placed against the source plate. (auth)

6350 LA-1201
Los Alamos Scientific Lab., N. Mex.
A MEASUREMENT OF THE AVERAGE FISSION CROSS SECTIONS OF Pu^{240} AND Pu^{241} IN THE FAST REACTOR NEUTRON SPECTRUM. Edward T. Jurney. Nov. 8, 1950. Decl. Dec. 7, 1955. 8p. Contract W-7405-eng-36. $0.15 (OTS).

A comparison chamber is described which was designed to be inserted into a reactor port in order to measure fission rates from neutron fluxes which had undergone a minimum of energy degradation. The cross section was inferred from a comparison of the fission counting rates from foils of known Pu^{240} enrichments with the rates from standard foil containing only Pu^{239}. Incidental to the Pu^{240} fission cross section measurement the experiment also yielded a measurement of the average fission cross section for Pu^{241}. (auth)

6351 MonP-78
[Clinton Labs., Oak Ridge, Tenn.]
FISSIONABILITY STUDIES—THERMAL FISSIONABILITY OF LEAD, BISMUTH AND PROTOACTINIUM^{233}. Problem Assignment No. PX10-17. J. J. Floyd. Feb. 25, 1946. Decl. Jan. 30, 1956. 15p. Contract W-35-058-eng-71. $3.30(ph OTS); $2.40(mf OTS).

A special treated photographic emulsion has been found capable of discriminating between fission fragments and α particles or protons. The sensitivity and efficiency of this method are high due to the low background produced by heavy neutron exposure. The technique has been applied to Pb, Bi, and Pa^{233}. No fission events were observed. The fission cross sections, is different from zero, are given. (auth)

6352 N-1755
[Chicago. Univ. Metallurgical Lab.]
LATTICE CONSTANTS OF BERYLLIUM. (Memo from Paul Gordon to Frank Foote. Nov. 30, 1944 and Memo from Frank Foote to Paul Gordon. Nov. 29, 1944 (MUC-FF-228)). Decl. Jan. 10, 1956. 8p. [Contract W-7401-eng-37]. $1.80(ph OTS); $1.80(mf OTS).

X-ray data on metallic Be are summarized. (B.J.H.)

6353 UCRL-449
California. Univ., Berkeley. Radiation Lab.
SUMMARY OF THE RESEARCH PROGRESS MEETING OF SEPTEMBER 1, 1949. R. K. Wakerling. Oct. 13, 1949. Decl. Jan. 27, 1956. 21p. Contract W-7405-eng-48. $4.80(ph OTS); $2.70(mf OTS).

Deuteron, proton, and α particle fission cross sections and excitation functions were measured for U^{238}, Th^{232}, and U^{235}. Proton fission excitation functions are included for Bi^{209} and Au^{197}. (K.S.)

NUCLEAR REACTORS

6354 A-4256
Knolls Atomic Power Lab. GE Nucleonics Project, Schenectady, N. Y.
THE PILE SIMULATOR: A NETWORK ANALOGUE TO THE 2-GROUP ANALYSIS. L. Tonks. Aug. 29, 1947. Decl. Dec. 3, 1955. 18p. (GE-LT-1). $0.20(OTS).

The network analogue to the 2-group analysis is described, and its equations are given in detail. (B.J.H.)

6355 AECD-3816
Westinghouse Electric Corp. Atomic Power Div., Pittsburgh.
THE EFFECTIVE XENON CROSS SECTION. H. L. Garabedian and R. R. Schiff. Sept. 1954. Decl. with deletions Dec. 6, 1955. 43p. Contract AT-11-1-GEN-14. $0.30 (OTS).

The notion of effective xenon cross section, as previously defined has been reassessed in the light of several recent advances in reactor theory: (i) use of the window-shade theory in studying partially inserted groups of control rods, (ii) use of the one-dimensional multiregion analogue machine (the GODDESS) in solving criticality problems with a variable absorption cross section, (iii) use of new techniques in evaluating an improved formulation of the effective xenon cross section. The definition of effective xenon cross section appears not only in the maximum xenon override problem but also in the temperature coefficient problem at the time of maximum xenon override, and differences in the interpretation of the definition in these two problems are discussed in detail. Two examples are studied in detail which illustrate the improved techniques developed in this paper for the evaluation of the effective xenon cross section in the maximum xenon override problem. Both examples serve to illustrate the striking effect of the preshutdown power level on the thermal flux distribution at the time of maximum xenon override and reveal convincingly earlier misconceptions on the problem. (auth)

6356 AECD-3837
[Westinghouse Electric Corp. Atomic Power Div., Pittsburgh.]
NOTES ON CONFERENCE ON REACTOR POISONS. CON-

FERENCE HELD AT WAPD JANUARY 3, 1952. R. R. Schiff. Aug. 1952. Decl. with deletions Dec. 6, 1955. 13p. Contract AT-11-1-GEN-14. $0.15(OTS).

6357 AECD-3860

[North American Aviation, Inc., Downey, Calif.]

CRITICAL ASSEMBLY AND PRELIMINARY OPERATION OF THE WATER BOILER NEUTRON SOURCE. M. E. Remley. June 9, 1952. Decl. Dec. 5, 1955. 20p. (NAA-SR-Memo-337). $0.20(OTS).

Fuel, in the form of a uranyl nitrate solution, highly enriched in U^{235}, was added to the core of the NAA Water Boiler type reactor. The critical mass has been determined to be 633.9 g of U^{235}. Since the addition of the fuel, an operational procedure has been inaugurated. Additional information about the characteristics of the reactor has been obtained with operational experience, and this has resulted in some changes in the apparatus. It is believed that the WBNS is now an adequate tool for experimental purposes. (auth)

6358 AECD-3920

Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.

TECHNICAL QUARTERLY REPORT [FOR] FIRST QUARTER [OF] 1953. F. W. Crawford. Apr. 21, 1953. Decl. with deletions Jan. 6, 1956. 24p. Contract AT(10-1)-205. $4.80(ph OTS); $2.70(mf OTS).

Investigations and calculations on the operation of the MTR have constituted a major portion of the quarter's activities of the technical staff. Neutron and gamma flux distributions have been determined in the reactor, reflector, and some experimental facilities. The vertical variation of flux with shim-rod position results in uneven burnout and in a limitation of the maximum power level of operation during a given run. Variations in fuel concentration, Al-to-H_2O ratio, and their effect on excess reactivity have been studied experimentally. General irradiations in the reactor have been undertaken. These are concerned mostly with long-term irradiations of MTR structural materials, fuel assemblies, Th and Bi slugs. The discoloration of glasses under severe gamma ray bombardment has been studied. In the cross sections program the crystal spectrometer has been installed in HB-4. Its operating characteristics are now being studied, preparatory to the collection of data. An arrangement of spent fuel assemblies in the canal has produced a gamma ray irradiation facility providing 10^6 to 10^7 r/hr. A standard graphite pile with a Ra–Be source for calibration of instruments has been erected and calibrated. A large hot cell and its associated building is under construction. Junior caves for radiochemistry are now available. (auth)

6359 AECD-3925

Argonne National Lab., Lemont, Ill.

EXPERIMENTAL BREEDER PROJECT REPORT FOR THE PERIOD MARCH 1, 1949 THROUGH JANUARY 31, 1950. H. V. Lichtenberger. Mar. 13, 1950. Decl. with deletions Dec. 14, 1955. 31p. Contract W-31-109-eng-38. $6.30 (ph OTS); $3.00(mf OTS).

The report covers the status of EBR construction; measurements of Co^{60}, Na^{24}, and fission-product γ-ray attenuation in concrete; examination of NaK-filled fuel rods and ball check rods for temperature distribution and NaK evaporation; examination of various EBR component mock-ups after operation; heat-transfer characteristics of vertical composite tube (NaK-H_2O) falling-film-type steam generator and water heater; tests of a rotating liquid seal for a liquid metal pump with a totally enclosed motor; and an experiment on the effects of pile irradiation on a U slug immersed in NaK. (G.Y.)

6360 AECD-3973

Oak Ridge National Lab., Y-12 Area, Tenn.

THE CONTRIBUTION OF THE (n,2n) REACTION TO THE BERYLLIUM MODERATED REACTOR. C. B. Mills and N. M. Smith, Jr. June 5, 1951. Decl. Jan. 27, 1956. 9p. Contract W-7405-eng-26. (Y-F10-55). $1.80(ph OTS); $1.80(mf OTS).

Data from the literature are used as a basis for estimating the cross section of the $Be^9(n,2n)Be^8$ reaction. It is shown that the production of fast neutrons by this method may account for the 10% discrepancy between the calculated value of k_{eff} for U–B critical assemblies and that obtained from critical experiments. (K.S.)

6361 AECD-3988

New York Operations Office, AEC.

REACTIVITY TEST FACILITY. PART II. PROPOSAL FOR A SLEEVE OSCILLATOR TEST REACTOR. Richard Hochschild. Apr. 28, 1953. Decl. with deletions Dec. 1, 1955. 32p. $0.25(OTS).

A contemplated neutron cross section (danger coefficient) test reactor for an NYOO production site is discussed. Applications for the reactor are outlined, and a review of existing test reactors is made with special attention to the limitations of the current methods and their suitability to the kind of tests intended. A new type of test scheme, sleeve oscillation, is proposed as a more sensitive and versatile test with maximum speed and simplicity of operation. This scheme does not call for an entirely new reactor design but involves some major modifications of an existing test reactor. (auth)

6362 AECD-4038

[Knolls Atomic Power Lab. GE Nucleonics Project, Schenectady, N. Y.]

APPROXIMATE METHODS FOR PILE DESIGN CALCULATIONS. Harvey Brooks. July 25, 1947. Decl. Jan. 16, 1956. 20p. (Memo-HB-5). $4.80(ph OTS); $2.70(mf OTS).

An approximate method is developed for calculating the effects of various changes in the design parameters of a reactor. The technique is intermediate in accuracy between diffusion theory and multigroup analysis, and is intended to provide rapid answers to particular design questions. The procedure is based on revised age theory. (K.S.)

6363 AECD-4042

[Knolls Atomic Power Lab., Schenectady, N. Y.]

EXPERIMENTAL FACILITIES FOR SCHENECTADY PILE. Harvey Brooks. Mar. 12, 1948. Decl. Jan. 30, 1956. 14p. (Memo-HB-14). $3.30(ph OTS); $2.40(mf OTS).

Brief general descriptions are given of the experimental facilities connected with the Schenectady pile. (B.J.H.)

6364 AECD-4055

[Tennessee Eastman Corp., Oak Ridge, Tenn.]

CRITICALITY IN GRAPHITE SYSTEMS. Raymond Murray and George W. Schmidt. [Jan. 1947]. Decl. Jan. 17, 1956. 8p. (A-7.390.21). $1.80(ph OTS); $1.80(mf OTS).

A modified thermal diffusion method is used to calculate critical conditions for U^{235}-contaminated graphite collectors from the electromagnetic separation process. (K.S.)

6365 AECD-4080

North American Aviation, Inc., Downey, Calif.

NEUTRON ECONOMY OF VARIOUS CONVERTER REACTOR DESIGNS. Ralph Balent. Dec. 12, 1951. Decl. Jan. 16, 1956. 5p. (NAA-SR-Memo-158). $1.80(ph OTS); $1.80(mf OTS).

Design constants for a few of the converter reactor designs considered for the production of U^{233} are listed. The neutron accounting for each of these designs is presented in tabular form. (C.H.)

6366 AECD-4198

Hanford Works, Richland, Wash.

GRAPHITE SAMPLE BORING FROM PROCESS CHAN-

NELS. Final Report on Production Test 105-389-P. J. B. Cole. July 10, 1951. Decl. with deletions Dec. 7, 1955. 9p. Contract W-31-109-eng-52. $1.80(ph OTS); $1.80 (mf OTS).

The graphite core borer was specifically designed to provide samples for the study of radiation damage to the graphite moderator. The operation of the core borer was tested, and results indicate that core boring is an entirely practical operation. Design and operating procedures for the borer are briefly summarized. (B.J.H.)

6367 ANL-4402
Argonne National Lab., Lemont, Ill.
MATERIALS TESTING REACTOR PROJECT QUARTERLY REPORT FOR PERIOD ENDING DECEMBER 1, 1949. J. R. Huffman. Decl. Jan. 23, 1956. 53p. Contract W-31-109-eng-38. $10.80(ph OTS); $3.90(mf OTS).

6368 ANL-4551
Argonne National Lab., Lemont, Ill.
EXPERIMENTAL FACILITIES PROVIDED IN THE MATERIALS TESTING REACTOR. Preliminary Report. R. K. Winkleblack. Dec. 29, 1949. Decl. Dec. 8, 1955. 39p. Contract W-31-109-eng-38. (ANL-SM-122). $0.30(OTS).

A detailed description is presented of preliminary designs for research facilities proposed for the Materials Testing Reactor. Preliminary design drawings are included. A brief description is also included of the reactor site, laboratories, and shops. (C.H.)

6369 APEX-121
General Electric Co. Aircraft Nuclear Propulsion Project, [Cincinnati].
CRITICAL MASS CALCULATIONS FOR BARE-HYDROGEN MODERATED REACTORS BY MEANS OF TRANSPORT THEORY. David Selengut. Sept. 1952. Decl. Dec. 12, 1955. 10p. $0.15(OTS).

Some previous results on the criticality of bare homogenous reactors are generalized. Assuming the extrapolation distance is energy independent, the asymptotic flux is derived as a product of space and energy dependent functions. No restrictions are made on the nature of the slowing down or on the number of spherical harmonics in the angular distribution of neutrons. Results are specialized to the case in which moderation is due mainly to hydrogen, and a numerical integration procedure is set up. (auth)

6370 BMI-700
Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF SCRAM-LATCH COMPONENTS FOR MARK I NAVAL REACTOR. D. R. Forry, E. L. Walls, R. L. Merrill, G. A. Waldie, and R. M. Conklin. Oct. 1, 1951. Decl. Dec. 9, 1955. 33p. Contract W-7405-Eng-92. $0.25 (OTS).

The development of improvements on an electrohydraulic mechanical scram-latch system for the Mark I Naval Reactor is described. The latch proper was revised to include a rolling disengagement which permitted the use of bearing surfaces of ample size and radii to carry both static and shock loads. The low energy required to release this latch permitted a reduction in size and complication of the hydraulically operated latch actuator. This advantage was also present in the design of an electrically operated scram valve. The scram valve is of the rotary-plug type to achieve hydraulic balance and low inertia. (auth)

6371 BNL-62
Brookhaven National Lab., Upton, N. Y.
EVALUATION OF CARBAGEL PROCESS FOR AIR REFRIGERATION FOR USE WITH BNL REACTOR. W. E. Winsche. Apr. 12, 1950. Decl. Jan. 5, 1956. 11p. Contract [AT-30-2-gen-16]. $1.80(ph OTS); $1.80 (mf OTS).

The Carbagel process consists of compressing air to 5 or 6 atm, cooling to room temperature, removing moisture with Carbagel adsorbent, and expanding isentropically through a turbine to 1 atm. Although the process is technically feasible, use for reactor cooling is not considered economical. (D.E.B.)

6372 BNL-1578
Brookhaven National Lab., Upton, N. Y.
ANALYSIS OF THE CLEAN BUCKLINGS OF 1.3 PER CENT ENRICHED URANIUM-WATER LATTICES. J. Chernick. Apr. 6, 1953. Decl. Dec. 13, 1955. 11p. $0.15(OTS).

6373 BNL-1581
Brookhaven National Lab., Upton, N. Y.
A SURVEY OF THE REFLECTOR SAVINGS OF URANIUM-WATER LATTICES. J. Chernick. July 27, 1953. Decl. Dec. 12, 1955. 26p. Contract [AT-30-2-gen-16]. $0.25(OTS).

A Univac survey of the reflector savings of enriched U–H_2O lattices as a function of pile and reflector parameters was carried out to determine the validity of calculating with the two-group reactor equations. (L.M.T.)

6374 BNL-1795
Brookhaven National Lab., Upton, N. Y.
THE SOLUTION OF REACTOR INTEGRAL EQUATIONS BY RELAXATION METHODS. J. Chernick. Mar. 29, 1954. Decl. Dec. 12, 1955. 14p. $0.20(OTS).

The integral form of the one-velocity reactor transport equation is reduced to a set of simultaneous linear equations. The use of relaxation methods is suggested when a large number of equations are involved. Labor-saving devices suggested by the neutron physics are explored. As an example, the non-leakage probability is calculated for thermal neutrons in a reactor with plane boundaries, and it is shown that accurate results may be obtained from a coarse mesh which extends only a few mean free paths from the boundary. Other applications of the method are discussed. (auth)

6375 BNL-2391
Brookhaven National Lab., Upton, N. Y.
SURVEY OF U-Bi REACTORS. (Reprint of Project Dynamo Memo PD-51). J. Chernick. Aug. 5, 1953. Decl. Dec. 15, 1955. 9p. $0.15(OTS).

A study has been made of reactors composed of a graphite structure with channels for a U–Bi solution in the core and a Th–Bi slurry in the blanket. The nuclear properties of this reactor type as a function of the degree of moderation and enrichment have been calculated. Results of calculations are presented on age as a function of Bi to C volume ratio, diffusion areas for various enrichments, multiplication factor and buckling, and breeding gain for various reactor designs. The problems that remain to be studied are summarized. (L.M.T.)

6376 CE-951
[Chicago. Univ.] Metallurgical Lab.
THERMAL WARPING OF GRAPHITE PILE. S. G. Bankoff, C. P. Cabell, and G. Rosner. Sept. 28, 1943. Decl. Dec. 12, 1955. 7p. (A-1347). $0.15(OTS).

6377 CF-47-1-41
Oak Ridge National Lab., Tenn.
CALCULATION OF LEVELS OF RADIOACTIVITY TO BE EXPECTED IN THE COOLANT OF THE POWER PILE. J. A. Swartout. Jan. 15, 1947. Decl. Feb. 2, 1956. 4p. $1.80(ph OTS); $1.80(mf OTS).

Estimates of the minimum and maximum levels of radioactivity which might be present in the He coolant of the

power reactor were calculated for the reactor in operation at the 40,000-kw level using jacketless fuel elements. Values are approximate but they do show that the presence in the He of at least 10^5c of activity originating from recoiled and/or diffused fission products is reasonable. (F.S.)

6378 CF-48-3-264
[Oak Ridge National Lab., Tenn.]
SHIELDING OF THE EXTERNAL WATER PIPES IN THE HIGH PRESSURE WATER PILE. Nicholas M. Smith, Jr. Mar. 4, 1948. Decl. Jan. 4, 1956. 13p. Contract [W-7405-eng-26]. $0.20(OTS).

Shielding requirements for LITR inlet and outlet H_2O ducts are calculated. The activities considered, 6.9-Mev β and 4.0-Mev γ, are products of the O^{16} $(n,p)N^{16}$ reaction. A cross section of 1 b and half life of 7.6 sec are used. (D.E.B.)

6379 CF-48-8-348
[Oak Ridge National Lab., Tenn.]
INFORMATION FOR REACTOR SAFEGUARD COMMITTEE MEETING. John R. Huffman and S. Untermyer. Sept. 9, 1948. Decl. Jan. 7, 1956. 13p. Contract [W-7405-eng-26]. $3.30(ph OTS); $2.40(mf OTS).

Heat removal by water, natural convection, and air cooling was evaluated in a study of the danger, after shutdown, of fuel element melting which would release fission products into the air. (F.S.)

6380 CF-48-9-126
Oak Ridge National Lab., Tenn.
RECOMMENDATION FOR IMMEDIATE SOLUTION TO AIRBORNE HAZARDS FROM THE PILE STACK. J. W. Gost. Sept. 8, 1948. Decl. Feb. 16, 1956. 3p. $1.80(ph OTS); $1.80(mf OTS).

Recommendations and the basis for such recommendations are listed and briefly discussed. (B.J.H.)

6381 CF-49-11-180
Oak Ridge National Lab., Tenn.
ARGON ACTIVITY IN REACTOR COOLING AIR. J. A. Lane. Nov. 17, 1949. Decl. Feb. 14, 1956. 4p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Calculations indicating the activity of the pile cooling air due to neutron capture in A and resulting A^{41} decay for the existing design of the graphite reflector. (F.S.)

6382 CF-49-12-84
[Oak Ridge National Lab., Tenn.]
MTR SHUTDOWN COOLING REQUIREMENTS. J. A. Lane. Dec. 16, 1949. Decl. Feb. 2, 1956. 6p. [Contract W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Calculations are given to show the amounts of air and H_2O required to remove fission product heat generated after shutdown of the MTR. (B.J.H.)

6383 CF-52-10-81
Oak Ridge National Lab., Tenn.
THERMAL STRESS IN THE ISHR PRESSURE VESSEL. I. Spiewak. Oct. 9, 1952. Decl. Dec. 19, 1955. 10p. Contract [W-7405-eng-26]. $0.15(OTS).

Cooling of the outside surface of the pressure vessel is effective in reducing thermal stress and can be accomplished with cooling coils circulating borated water or with air circulation. (F.S.)

6384 CF-52-12-145
Oak Ridge National Lab., Tenn.
THERMAL STRESS ANALYSIS OF A 6-FT DIAMETER, 50 MW SINGLE REGION REACTOR VESSEL. R. H. Chapman. Dec. 12, 1952. Decl. Jan. 11, 1956. 22p. Contract [W-7405-eng-26]. $4.80(ph OTS); $2.70(mf OTS).

6385 CF-53-3-125
Oak Ridge National Lab., Tenn.
MULTIGROUP METHOD CALCULATIONS. A. H. Fox. Mar. 16, 1953. Decl. Nov. 30, 1955. 5p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

6386 CF-53-9-33
Oak Ridge National Lab., Tenn.
DESIGN CALCULATIONS FOR STEAM SYSTEM FOR 10 Mw PRESSURIZED-WATER POWER REACTOR. R. C. Robertson. Sept. 30, 1953. Decl. Dec. 22, 1955. 51p. Contract [W-7405-eng-26]. $0.35(OTS).

Steam-cycle performance calculations and design details are outlined for the steam system of a 10-Mw pressurized water power reactor. The system was designed for a 1-Mw net electrical load, with an average load of 875 kw at 70% rated capacity. (K.S.)

6387 CF-53-9-75
Oak Ridge National Lab., Tenn.
FLUID FLOW THROUGH A SPHERICAL VESSEL CONTAINING DISTRIBUTED HEAT SOURCES. David H. Fax. Sept. 10, 1953. Decl. Dec. 20, 1955. 21p. Contract [W-7405-eng-26]. $0.25(OTS).

The velocity and temperature distribution within a 6-ft spherical vessel have been found under the assumption that the flow is a potential one uncomplicated by frictional or bouyant forces and assuming no heat diffusion. (F.S.)

6388 CF-53-12-108
Oak Ridge National Lab., Tenn.
THE INHOUR FORMULA FOR A CIRCULATING-FUEL NUCLEAR REACTOR WITH SLUG FLOW. W. K. Ergen. Dec. 22, 1953. Decl. Dec. 20, 1955. 8p. Contract [W-7405-eng-26]. $0.15(OTS).

The inhour formula for a circulating-fuel reactor is derived by modification of the equation for stationary-fuel reactors, taking into account the difference in dynamic behavior due to the transport of fuel to regions where delayed neutrons cannot contribute to the chain reactions. The case considered is derived for low reactor power where an increase in power will not cause an increase in temperature. The result provides a convenient expression for excess k as a function of the power time constant T, requiring only the delayed neutron decay constants and the transit of fuel through the reacting volume and fuel circuit. (K.S.)

6389 CF-54-3-120
Oak Ridge National Lab., Tenn.
AN HARMONICS METHOD APPLIED TO D_2O MODERATED REACTORS. M. C. Edlund and L. C. Noderer. Mar. 18, 1954. Decl. Dec. 15, 1955. 14p. Contract [W-7405-eng-26]. $0.20(OTS).

An harmonics method for systems with spherical symmetry was investigated to check its suitability for making critical mass calculations for the HRT. The derivation of the harmonics method is outlined, and a series of test calculations were made for a Yukawa kernel. (B.J.H.)

6390 CF-54-4-182
Oak Ridge National Lab., Tenn.
REACTIVITY EFFECTS OF NON-UNIFORM DENSITY CHANGES IN HRT. V. K. Pare'. Apr. 26, 1954. Decl. Dec. 19, 1955. 26p. Contract [W-7405-eng-26]. $0.25(OTS).

Calculations and results are presented for reactivity changes resulting from varied non-uniform fuel and blanket density variations. (T.W.S.)

6391 CF-54-6-180
Oak Ridge National Lab., Tenn.
A TWO-REGION HOMOGENEOUS REACTOR WITHOUT A CORE TANK. Sidney Visner. June 23, 1954. Decl. Dec. 19, 1955. 7p. $0.15(OTS).

6392 CF-54-9-97
Oak Ridge National Lab., Tenn.
CALCULATION OF FERMI AGES FOR ThO_2-HEAVY

WATER SLURRIES. M. Tobias. Sept. 14, 1954. Decl. Dec. 20, 1955. 10p. Contract [W-7405-eng-26]. $0.15(OTS).

The Fermi age of thoria – heavy water slurries considering inelastic scattering by thoria, presence of H_2O in heavy water, and the energy spectrum of fission neutrons was calculated. It was found that thoria slows neutrons down at higher energy levels more effectively than heavy water. (F.S.)

6393 CF-54-10-146
Oak Ridge National Lab., Tenn.
THERMAL STRESS IN THE TBR PRESSURE VESSEL. TBR MEMO NO. 5. J. R. McWherter. Oct. 28, 1954. Decl. Dec. 20, 1955. 19p. Contract [W-7405-eng-26]. $4.80(ph OTS); $2.70(mf OTS).

Calculations were made to determine the combined pressure and thermal stresses in the Thorium Breeder Reactor pressure vessel wall as a function of the vessel wall and thermal shield thicknesses. The magnitude of the thermal stress depends on the heat generation in the wall and the method of cooling the wall. Heat is generated in the vessel wall as a result of radiation absorption. The principal types of radiation which contribute to the heat generation include thermal neutrons, fast neutrons, and γ radiation. A sketch of the proposed vessel is included. (C.H.)

6394 CP-475
[Chicago. Univ.]
EFFECTIVE TEMPERATURE OF NEUTRONS IN A LATTICE. L. Woods. Feb. 10, 1943. Decl. Jan. 17, 1956. 7p. (A-463). $1.80(ph OTS); $1.80(mf OTS).

The average energies of neutrons emitted from a graphite column at 22° and at 257°C were compared by measurement of the cross section of boron for neutrons which are stopped by cadmium. At a distance from the neutron source great enough to insure that the neutrons were in thermal equilibrium the average energies of the emerging neutrons were found to be proportional to the temperatures within the limits of experimental error. A measurement made with boron absorbers which had been standardized in the graphite column indicated neutrons emerging from the chain reacting pile to have an average temperature approximately 60 ± 30° above that of thermal neutrons emerging from the graphite column at 22°C. Such a measurement made inside the chain reacting pile indicated the average temperature of neutrons to be about 85° ± 15° above the average temperature of neutrons in the graphite column. (auth)

6395 CP-1129
[Chicago. Univ.] Metallurgical Lab.
TEMPERATURE EFFECT IN HOMOGENEOUS PILE. Gale Young. Dec. 9, 1943. Decl. Jan. 18, 1956. 6p. Contract W-7401-eng-37. (A-1617). $1.80(ph OTS); $1.80(mf OTS).

Some idealized considerations of the temperature field in the homogeneous pile are given. It is crudely estimated that the effective mean temperature rise of the pile to be used in calculating the k loss is something like ¾ the rise in temperature of the slurry in passing through the pile. (auth)

6396 CP-1577
Chicago. Univ. Metallurgical Lab.
THE PILE SAFETY CIRCUIT. Leonard G. Nierman. Apr. 14, 1944. Decl. Feb. 14, 1956. 6p. (A-2243). $1.80(ph OTS); $1.80(mf OTS).

Two suggestions concerning the electronic relay which actuates the reactor safety rod release mechanism are discussed. Designs are given for an improved trip circuit of such sensitivity and stability as to allow it to be actuated by a signal directly from the chamber. Suggestions were also given for a triple-wound relay to prevent false shutdowns of the reactor. (B.J.H.)

6397 CP-2324
Chicago. Univ. Metallurgical Lab.
SLUG JACKET TEMPERATURES. Richard Schlegel. Nov. 8, 1944. Decl. Jan. 18, 1956. 8p. $1.80(ph OTS); $1.80(mf OTS).

Temperature rise in the slug jacket from variation in the coefficient of heat transfer from jacket to cooling water is due to the lowering of the coefficient of heat transfer in the rib region. Jacket temperatures are calculated and applications are given. (F.S.)

6398 CP-2709
[Chicago. Univ. Metallurgical Lab.]
THE EFFECT OF BUBBLING ON THE MULTIPLICATION CONSTANT. J. Ernest Wilkins, Jr. Feb. 10, 1945. Decl. Dec. 16, 1955. 16p. Contract W-7401-eng-37. $0.20 (OTS).

The evolution of gas bubbles in a homogeneous converter or breeder pile makes it necessary to have a somewhat higher multiplication constant than would otherwise be required. In this paper a formula is derived for the change δk in the multiplication constant. (auth)

6399 CP-3407
Chicago. Univ. Metallurgical Lab.
THE LAPLACIAN FOR A BERYLLIUM METAL LATTICE OF VOLUME RATIO 17.2. M. Goldberger, A. Wattenberg, and W. Zinn. Jan. 16, 1946. Decl. Jan. 18, 1956. 12p. Contract W-7401-eng-37. $3.30(ph OTS); $2.40(mf OTS).

The Laplacian of a Be metal lattice with 3.3 kg of uranium metal per cell and a volume ratio of 17.2 was measured in the removable region of the CP-2 machine. The sandwich effect with different moderators made interpretation of the observations very uncertain. The best result found was

$$\Delta_{Be} = 407 \times 10^{-6}\ \text{cm}^{-2}.$$

(auth)

6400 HKF-2
Ferguson (H. K.) Co., New York.
MACHINING OF GRAPHITE FOR BROOKHAVEN REACTOR. C. R. Binner, Philip Miller, and K. W. Comsey. June 1, 1949. Decl. Dec. 5, 1955. 77p. [For Brookhaven National Lab.] Contract AT-30-2-Gen-16, AEM S-26. $0.45 (OTS).

The Oak Ridge and Hanford reactor graphite had been machined with difficulty on woodworking equipment. This experience led to the evaluation and selection of metalworking machinery for fabricating Brookhaven Reactor graphite. The graphite requirements and machining experience of this operation are reported. (D.E.B.)

6401 HW-16092
[Hanford Works, Richland, Wash.]
PROCESS TUBE TEMPERATURE MAPPING. Progress Report. Rodney G. Hoff. Feb. 24, 1950. Decl. Feb. 15, 1956. 14p. Contract [W-31-109-eng-52]. $3.30 (ph OTS); $2.40(mf OTS).

Circuit diagrams are given for instruments to scan the thermocouples located at the exit end of each process tube in a reactor and to display and monitor these temperatures and temperature deviations. (B.J.H.)

6402 HW-3-2347
Hanford Works, Richland, Wash.
TEMPERATURE MEASUREMENT OF A PLAN IN AN OPERATING UNIT; FINAL REPORT ON PRODUCTION TEST NO. 105-18-P. C. E. Kircher. May 5, 1945. Decl. Jan. 5, 1956. 7p. Contract [W-31-109-eng-52]. $1.80(ph OTS); $1.80(mf OTS).

Details of a procedure for the fabrication, testing, and installation of a heavy metal slug, containing an internally mounted thermocouple, were completed and one unit made for plant use. This experimental slug successfully passed an 80-hr autoclave test indicating that the design and

fabrication were adequate from an operation standpoint. Design features are discussed for record purposes. Special drilled slugs will be held for possible future use. (auth)

6403 HW-7-2318
Hanford Works, Richland, Wash.
EFFECTIVENESS OF POISON COLUMNS SHADOWING EFFECT IN ELEVEN COLUMN PATTERN. R. L. Menegus. Aug. 11, 1945. Decl. Jan. 5, 1956. 3p. Contract [W-31-109-eng-52]. $1.80(ph OTS); $1.80(mf OTS).

6404 HW-7-3721
Hanford Works, Richland, Wash.
PILE POISON—PROCEDURE FOR CALCULATING EFFECT OF VARIOUS MATERIALS ON PILE REACTIVITY. R. L. Menegus. Mar. 19, 1946. Decl. Jan. 5, 1956. 6p. Contract [W-31-109-eng-52]. $1.80(ph OTS); $1.80(mf OTS).

Nomographs and equations are given for calculating the effect of various materials on reactor reactivity. (B.J.H.)

6405 IDO-16024
Phillips Petroleum Co. Atomic Energy Div. Idaho Falls, Idaho.
CALCULATION OF RATE OF POISON BUILDUP IN BERYLLIUM REFLECTOR IN MTR. W. L. Morris. July 1, 1952. Decl. Jan. 6, 1956. 10p. $1.80(ph OTS); $1.80(mf OTS).

6406 IDO-16077
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
TEMPERATURE COEFFICIENT OF THE MTR AT 30 MEGAWATTS. W. J. Byron and J. W. Webster. Feb. 16, 1953. Decl. Jan. 7, 1956. 9p. Contract AT(30-1)-205. $0.15(OTS).

The temperature coefficient of the MTR was measured with the reactor operating at full power by observing the compensating motion of the regulating rod upon lowering the inlet water temperature. The present result is in reasonably good agreement with the result obtained in a "zero"-power experiment with external heating of the water. Within the limits of uncertainty of the experiment there seems to be no significant change in the temperature coefficient when the reactor is at full power and the fuel, water, and Be are at different temperatures compared to the "zero"-power case where everything is at the same temperature. (auth)

6407 IDO-16222
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
ENGINEERING TEST REACTOR. J. W. Webster. Mar. 18, 1955. Decl. Jan. 7, 1956. 32p. Contract AT(10-1)-205. (Web-24-54A). $0.25(OTS).

Flux perturbations existing in a 6 in. × 6 in. and a 9 in. × 9 in. experimental facility in the ETR were investigated for various mixtures of Na, U^{235}, Fe, and Be in the hole. The depressed flux in the 9 in. × 9 in. hole will not be much less than in the 6 in. × 6 in. hole for any reasonable composition. Present core design now calls for five separated experimental regions for test and exposure purposes. (K.S.)

6408 K-864
Massachusetts Inst. of Tech., Oak Ridge, Tenn. Engineering Practice School.
DETERMINATION OF POWER LEVEL FOR LOW INTENSITY TRAINING REACTOR AT OAK RIDGE. M. W. Belaga, R. J. Mulvihill, and I. S. Zonis. Jan. 29, 1952. Decl. Dec. 5, 1955. 35p. Contract [W-7405-eng-26], Subcontract 70. $0.25(OTS).

The LITR (Low Intensity Training Reactor at Oak Ridge) was operated at fission rate of 0.269×10^{16}/sec. to 2.34×10^{16}/sec., and thermal energy balances were made about the reactor, shield, and cooling system to determine the power level at each fission rate. The steady-state heat loss through the reactor tower and shield was found to be small relative to the total power level, and a heat balance on the cooling water alone was found to give an estimate of the power level accurate within approximately 5%. The measured power levels were corrected for heat losses and losses in radiation and neutron energy into the shield, and from these data an apparent fission energy of 200 Mev was obtained. (auth)

6409 KAPL-71
Knolls Atomic Power Lab., Schenectady, N. Y.
PERTURBATION METHODS IN MULTI-GROUP CALCULATIONS. Harvey Brooks. May 25, 1948. Decl. Dec. 5, 1955. 12p. Contract W-31-109-Eng-52. $0.15(OTS).

The first order perturbation theory outlined by Wigner in CP-3048 is used to derive expressions for the change in reactivity resulting from arbitrary changes in the cross sections in the multigroup equations for a pile. A modification of the theory adaptable to the multi-group method of Hurwitz and Ehrlich is discussed. A method of estimating the error in the Hurwitz-Ehrlich scheme is also derived. A derivation is given for the prompt pile period due to a perturbation of the constants. Finally, the results are translated in terms of age-diffusion theory, and applied to the particular case of a bare spherical pile. It is pointed out that the operators in the unperturbed problem do not have an inverse, and that therefore only the first-order perturbation theory is valid. (auth)

6410 KAPL-329(Pt. I)
Knolls Atomic Power Lab., Schenectady, N. Y.
ACTIVATION EXPERIMENTS IN THE KAPL PRELIMINARY PILE ASSEMBLIES. PART I. EXPERIMENTAL PROCEDURES. H. B. Stewart and G. B. Gavin. Sept. 20, 1950. Decl. Jan. 7, 1956. 52p. Contract W-31-109-eng-52. $0.35(OTS).

A description is given of the experimental procedures and calibration experiments required for the activation measurements conducted on several critical assemblies to obtain a preliminary knowledge of the characteristics of reactors having a neutron spectrum predominately in the critical energy range. (F.S.)

6411 KAPL-329(Pt. II)
Knolls Atomic Power Lab., Schenectady, N. Y.
ACTIVATION EXPERIMENTS IN THE KAPL PRELIMINARY PILE ASSEMBLIES. PART II. RESULTS OF POWER DISTRIBUTION AND NEUTRON FLUX EXPERIMENTS FOR PPA-2, -3, -4, AND -5. H. B. Stewart and G. B. Gavin. Sept. 20, 1950. Decl. Jan. 7, 1956. 41p. Contract W-31-109-eng-52. $0.30 (OTS).

The characteristics of reactors having a neutron spectrum in the intermediate energy range have been investigated in several preliminary pile assemblies (PPA) located at the Sacandaga Site of the Knolls Atomic Power Laboratory. This report is a description of activation experiments in the four assemblies, PPA-2, -3, -4, and -5. The purpose of the experiments was to measure the power distribution in the reactor core, the fraction of fissions resulting from neutrons having energies below the cadmium cutoff (cadmium fraction), the spatial distribution of the epithermal flux, and the energy distribution of the epithermal flux. (auth)

6412 KLX-1732
Vitro Labs., West Orange, N. J.
HOMOGENEOUS REACTOR FUEL REPROCESSING QUARTERLY PROGRESS REPORT [FOR] JULY 1—SEPTEMBER 30, 1954. Job 1087. Oct. 30, 1954. Decl. Dec. 1, 1955. 13p. For Oak Ridge National Lab. Contract W-7405-eng-26, Subcontract No. 535. $0.20(OTS).

A laboratory study was made of the behavior of I in fuel solution at reactor temperatures, and a means of reducing the level of build-up of this fission product in the core system was developed. The extreme insolubility of silver iodide and silver iodate suggest the use of metallic Ag for removing I from the reactor fuel system. Three alternative processes considered were silver in contact with fuel circulating in the primary reactor loop at 280 to 310°C, silver in contact with the cooled solution at 100°C, and silver in contact with vapor in the off-gas system to remove I_2. The first process was found to be impractical because of the rapid corrosion of Ag by the fuel solution. Plans are made to evaluate the other processes further. Attempts to remove iodate ion with metallic Pb were unsuccessful. Precipitants and carriers for Cs were investigated. Liquid Ga was investigated as a possible aid to solids separation in the fuel processing loop. (auth)

6413 LA-1123
Los Alamos Scientific Lab., N. Mex.
NEUTRON ENERGY DISTRIBUTION OF WATER BOILER FAST NEUTRON BEAM FROM 0.5 TO 6 MEV. Norris Nereson, Julia Carlson, and Jewell Erickson. June 13, 1950. Decl. Jan. 6, 1956. 27p. Contract W-7405-eng-36. $0.25(OTS).

This report concerns itself with the neutron energy distribution of the east port of the water boiler with a U^{235} source inserted. The work was done with nuclear plates and provides reliable data in the energy region from 0.5 to 6 Mev. The report is essentially a supplement to LA-718 which deals with the identical neutron spectrum in the energy region from 3.3 to 17 Mev. In addition to extending the knowledge of the neutron spectrum of the water boiler fast beam, the experiment also gives information on the influence of a collimating tube on a neutron spectrum. (auth)

6414 M-4079
Clinton Labs., Oak Ridge, Tenn.
GAS COOLED PEBBLE PILES. A. Amorosi. Aug. 7, 1947. Decl. Dec. 5, 1955. 6p. $0.15(OTS).

A gas-cooled cylindrical pebble pile in which the gas flows axially from one face of the cylinder to the other will produce in the order of ½ the specific power (kw output per unit pile void volume) of a similar size pile in which the flow is in continuous channels for the same operating pressure, temperatures, etc. This is evident from the fact that the heat transfer rate per unit friction power is many times poorer (about 20 times poorer) for a pebble bed than for flow inside of tubes. A quantitative comparison of the size of a pebble pile vs. a continuous channel pile is tabulated. (auth)

6415 M-4372
[Argonne National Lab., Lemont, Ill.]
PLUG HANDLING FACILITIES. A. B. Schultz. June 23, 1949. Decl. Nov. 28, 1955. 8p. Contract [W-31-109-eng-38]. $1.80(ph OTS); $1.80(mf OTS).

Several suggestions related to plug handling facilities for the MTR are included. (B.J.H.)

6416 MonE-64
Clinton National Lab., Oak Ridge, Tenn.
HOMOGENEOUS PILE WATER ACTIVITY. Final Report. M. Monet. Feb. 8, 1946. Decl. Jan. 30, 1956. 13p. Contract W-35-058-eng-71. $3.30(ph OTS); $2.40(mf OTS).

Active solution from a 10,000-kw homogeneous reactor, when circulated through a trombone cooler, produces a delayed neutron flux of 10^9 neutrons/sec/cm^2 which causes metal recoils, activation of corrosion products, and activation of dissolved salts in the cooling water. The activities of interest are those of (1) the cooling water stream, as curies per cc; (2) the stack gases from the cooling tower; (3) the ground surrounding the stack, contaminated by the solids from the water entrained by the gases leaving the cooling tower. The activity, including corrosion and recoils, in the circulating coolant stream, is about 60 dis/sec cc for demineralized water and about 180 dis/sec cc for filtered water under the conditions imposed. The stack gases have an activity of less than 0.5 curie per day. If the activity on the ground surrounding the stack is to be held at a level of 5 dis/min/cm^2, an area of 7.5 sq miles will be needed for the dust if filtered water is used; 6 sq miles if demineralized water is used. A comparison of the activities to be expected when filtered or demineralized water is used is given. Sodium, chromium, and manganese are the main contributors to the activity. (auth)

6417 MonN-308
Clinton Labs., Oak Ridge, Tenn.
STEAM BOILER FOR GAS COOLED PILE. G. B. Emerson. May 27, 1947. Decl. Jan. 27, 1956. 21p. Contract W-35-058-eng-71. $4.80(ph OTS); $2.70(mf OTS).

The factors considered in arriving at selection of the type of steam boiler best suited to the requirements of the high-temperature power pile to be constructed at Clinton Laboratories are outlined. The sixteen principal factors considered in this connection are discussed in some detail. It is concluded that the forced recirculation type boiler is the most suitable type for this project. Preliminary specifications developed for this type of boiler are given in an appendix. (auth)

6418 MonP-203
Clinton Labs., Oak Ridge, Tenn.
ION CHAMBER FOR CONTROL AND OPERATION OF CLINTON HIGH FLUX PILE. F. C. Armistead. Nov. 6, 1946. Decl. Jan. 30, 1956. 23p. Contract W-7405-eng-39. $4.80(ph OTS); $2.70(mf OTS).

A study is made of the effective range of the ion chamber used to detect power level changes in the high-flux pile. The specifications for such an instrument are outlined. (B.J.H.)

6419 N-1543
[Clinton Labs., Oak Ridge, Tenn.]
ON THE SIMULTANEOUS ACTION OF SEVERAL CONTROL RODS. L. W. Nordheim. Aug. 28, 1944. Decl. Jan. 30, 1956. 2p. $1.80(ph OTS); $1.80(mf OTS).

Equations are given for the mutual influence of control rods placed at different positions in a reactor. (B.J.H.)

6420 ORNL-30
[Oak Ridge National Lab., Tenn.]
A METHOD OF SOLUTION OF THE CRITICAL MASS PROBLEM FOR A THERMAL PILE WITH SLOWING DOWN PROPERTIES INDEPENDENT OF POSITION. G. Goertzel and H. L. Garabedian. May 28, 1948. Decl. Jan. 6, 1956. 22p. Contract W-35-058-eng-71. $0.25(OTS).

The critical mass problem is studied for the thermal reactor by the method of harmonics. A brief survey of the method of harmonics is included. Fundamental sets of orthogonal functions and basic formulas for slab, sphere, and cylinder geometries are given. Certain basic slowing down kernels are listed together with their Fourier transforms. The critical equation is also given in the various geometries. (B.J.H.)

6421 ORNL-401
Oak Ridge National Lab., Tenn.
DETERMINATION OF SHIELD REQUIREMENTS FOR A 4-INCH SQUARE STRAIGHT HOLE THROUGH THE ORNL SHIELDS. R. L. Clark, J. D. Flynn, and C. E. Clifford. Nov. 1, 1949. Decl. Jan. 6, 1956. 15p. Contract W-7405-eng-26. $0.20(OTS).

Measurements were made of fast and thermal neutrons, and of gamma radiation, streaming through a four-inch

square straight hole (#61-S) through the ORNL reactor and shield. The hole was covered with slabs of lead, paraffin, and "boroffin" (paraffin–B_2O_3 mixture), in various arrangements. The following conclusions are drawn. The minimum shield thickness to reduce all radiation to 8-hour operating tolerance is twenty-two inches. The presence of boron has a small, but worthwhile, effect on the gamma attenuation. The arrangement resulting in minimum weight and cost consists of four four-inch layers of boroffin, separated by three two-inch layers of lead. Moving the lead further into the shield increases appreciably the production of secondary gamma radiation in the shield. Nearly equal neutron shielding is required in all directions, i.e., scattering in the paraffin causes the hole to appear almost as an isotropic point source, requiring a hemispherical shield. (auth)

6422 ORNL-548
Oak Ridge National Lab., Tenn.
PRESSURE DIFFERENCES ACROSS PLATES ADJACENT TO THIN ANNULI IN FUEL ASSEMBLY. W. K. Stromquist. July 12, 1948. Decl. Jan. 30, 1956. 7p. (CF-48-8-48). $1.80(ph OTS); $1.80(mf OTS).

6423 ORNL-628
Oak Ridge National Lab., Tenn.
MATERIALS TESTING REACTOR PROJECT PROGRESS REPORT FOR THE PERIOD ENDING FEBRUARY 28, 1950. Apr. 10, 1950. Decl. Jan. 30, 1956. 46p. Contract W-7405-eng-26. $7.80(ph OTS); $3.30(mf OTS).

6424 ORNL-728
Oak Ridge National Lab., Tenn.
THE BUBBLE PROBLEM IN THE HOMOGENEOUS REACTOR. J. A. Lane. Aug. 5, 1949. Decl. Jan. 30, 1956. 9p. (CF-49-8-97). $1.80(ph OTS); $1.80(mf OTS).

Studies reported on the solubility of H in water at high pressures and temperatures, and the formation and collapse of bubbles supplied data to be used to determine the amount of liquid purge to eliminate or reduce bubbles by flash vaporization of a portion of the homogeneous reactor solution. (F.S.)

Refer also to abstracts 6292 and 6435.

NUCLEAR TRANSFORMATION

6425 AECD-3943
[Clinton Labs., Oak Ridge, Tenn.]
A CONSIDERATION OF THE VARIATION OF NUCLEAR CHARGE AMONG THE PRIMARY FISSION PRODUCTS. L. E. Glendenin, C. D. Coryell, R. R. Edwards, and M. H. Feldman. July 25, 1946. Decl. Dec. 21, 1955. 40p. Contract [W-7405-eng-39]. (CL-LEG-1). $0.30(OTS).

The problem of nuclear charge distribution in the primary fission fragments is considered in the light of recent data on the fission yields of some shielded nuclei and other project data including those from gas sweeping experiments. A useful hypothesis of charge distribution based on the postulate of equal chain length is developed, and a quantitative distribution curve for the nuclear charge of primary fission products with given mass is presented. Other postulates of charge distribution in fission are considered and evaluated, and an attempt is made to consider all available project data bearing on the subject. (auth)

6426 LAMS-991
Los Alamos Scientific Lab., N. Mex.
SPONTANEOUS FISSION OF 48 (Pu-238). John Jungerman. Dec. 19, 1949. Decl. Dec. 10, 1955. 4p. $1.80(ph OTS); $1.80(mf OTS).

PARTICLE ACCELERATORS

6427 AECD-4005
California Research and Development Co., Livermore, Calif.
FRACTION OF TOTAL BEAM CURRENT AS A FUNCTION OF A-12 BEAM RADIUS. R. L. McKisson. May 24, 1951. Decl. Jan. 4, 1956. 6p. (CRD-T2A-22; LWS-23101). $1.80(ph OTS); $1.80(mf OTS).

Equations are presented showing the fraction of the beam current from the Materials Testing Accelerator (Mark II) that would pass through a circle of given radius, concentric with the beam axis. (C.H.)

6428 LRL-134
California Research and Development Co. Livermore Research Lab., Livermore, Calif.
CORRECTION FOR MAGNET FAILURE BY STRENGTHENING ADJACENT MAGNETS IN SOLENOIDALLY-FOCUSED LINEAR ACCELERATOR. C. S. Gardner. May 1954. Decl. Dec. 7, 1955. 9p. Contract AT(11-1)-74. $0.15 (OTS).

In a linear accelerator using solenoidal focusing, a mathematical analysis of the amount of increase in magnetic fields of adjacent magnets is made for the case where one magnet loses its power. The assumption is made that no beam particles may be lost to the drift tube surfaces. Results indicate that power to adjacent magnets would need to be more than doubled. A practical situation would allow some beam loss thereby requiring less power increase. (auth)

6429 ORNL-1196
Oak Ridge National Lab., Tenn.
THE OAK RIDGE 86-INCH CYCLOTRON. Robert S. Livingston and Alfred L. Boch. June 12, 1952. Decl. Jan. 6, 1956. 145p. Contract W-7405-eng-26. $0.70(OTS).

The design, construction, and development of the 86-inch fixed-frequency proton cyclotron are described. Unusual features of the machine are the vertical suspension of the dees in a horizontal magnetic field, the high proton beam energy obtained by the use of high r-f potential on the dees, and an internal proton beam current exceeding one milliampere at 23 Mev. Major problems encountered were the control of "ion loading" in the resonant system, obtaining maximum energy, and the development of adequate targets. Design and construction began in August 1949. Within two years the proton beam power exceeded 30 kw. (auth)

6430 Y-760
Oak Ridge National Lab., Y-12 Area, Tenn.
THEORY OF PHASE–COMPENSATED FIXED FREQUENCY CYCLOTRON. Bernard L. Cohen. May 8, 1951. Decl. Jan. 27, 1956. 16p. Contract W-7405-eng-26. $3.30(ph OTS); $2.40(mf OTS).

The theory of the phase-compensated cyclotron is developed by a differential equation method. The results are obtained more easily and with clearer physical meaning than by Thomas's original method (Phys. Rev. 54, 580(1938)). (auth)

RADIATION EFFECTS

6431 IDO-16162
Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.
DIMENSIONAL STABILITY OF IRRADIATED THORIUM. J. B. Burnham and M. H. Bartz. Apr. 13, 1954. Decl. Jan. 6, 1956. 10p. Contract AT(10-1)-205. $0.15(OTS).

Twenty Hanford-size Th slugs were irradiated in two MTR reflector positions to a maximum exposure of 10^{21}

ent. Four slugs were sent to ORNL for measurement and the rest were checked in the MTR hot cell. Results of these measurements show that hot rolled Th is dimensionally stable under irradiation. (auth)

6432 KAPL-677

Knolls Atomic Power Lab., Schenectady, N. Y. and Massachusetts Inst. of Tech., Cambridge.

AN X-RAY METHOD FOR STUDYING RADIATION DAMAGE IN GRAPHITE. D. R. Chipman and B. E. Warren. Feb. 1, 1952. Decl. Jan. 7, 1956. 37p. Contracts W-31-109-eng-52 and AT(30-3)-49. $0.25(OTS).

Radiation damage in graphite produces in certain x-ray reflections a broadening of the diffraction peak, accompanied always by a shift of the peak position toward smaller angle. A treatment analogous to that used for cold work distortion in metals is applicable, and the analysis outlined by Warren and Averbach is presented for the case of damaged graphite. Using several orders of the (002) reflection, the complex Fourier coefficients are obtained, and from these a function is synthesized giving the distribution of changes in distances perpendicular to the graphite layers. (auth)

6433 MIT-1085

Massachusetts Inst. of Tech., Cambridge.

EFFECT OF IRRADIATION ON THE X-RAY LINE SHAPE OF 2S ALUMINUM FROM A HANFORD WATER COOLING TUBE. J. L. Klein and W. B. Nowak. May 1952. Decl. Dec. 7, 1955. 24p. Contract AT(30-1)-981. $0.20(OTS).

Measures of the internal distortions in cold worked and irradiated 2S aluminum have been made by means of a Fourier analysis of x-ray line shapes. The (220) and the (311) reflections were recorded on a Norelco High-Angle Spectrometer. Changes in the resolution of the Kα doublet indicated that a fast neutron irradiation of about 4×10^{20} n/cm^2 produced further distortions in previously cold worked 2S aluminum. The Fourier coefficients yield quantitative values for the rms distortions produced by cold work and by cold work plus irradiation. Residual rms strains attributable to irradiation are of the same order of magnitude (0.1%) as those caused by cold work. (auth)

6434 NAA-SR-71

North American Aviation, Inc., Downey, Calif.

A PROGRAM FOR THE STUDY OF RADIATION EFFECTS ON MECHANICAL PROPERTIES. G. J. Dienes. June 7, 1950. Decl. Dec. 5, 1955. 29p. Contract AT-11-1-Gen-8. $0.25 (OTS).

The main purpose of this report is to indicate the most promising avenues of approach in studying the effect of radiation on mechanical properties. First, a critical analysis of fundamental knowledge of the mechanical properties of solids is presented and the main gaps in theoretical understanding are pointed out. Consequently, some mechanical properties are far more suitable than others for a fundamental study of radiation effects. A brief description of radiation effects is given. This is followed by a discussion of the mechanical properties most profitably studied from a fundamental standpoint and those which can only be treated empirically at the present time. A set of specific suggestions is given for an exploratory program. (auth)

6435 NAA-SR-95

North American Aviation, Inc., Downey, Calif.

RADIATION DECOMPOSITION OF REACTOR MATERIALS IN THE NAA-NPR. M. H. Feldman. Jan. 15, 1951. Decl. Jan. 13, 1956. 17p. Contract AT-11-1-Gen-8. $3.30 (ph OTS); $2.40(mf OTS).

The radiation chemistry problems in the NAA-NPR design proposed in NAA-SR-90, are considered with respect to: moderator (D_2O) decomposition; ion exchange material stability; and utility of plastic components at certain regions in the reactor. The possible behavior of the Li – H^3 system under temperature and irradiation is discussed. (auth)

6436 NAA-SR-211

North American Aviation, Inc., Downey, Calif.

CHANGE IN MAGNETIC SUSCEPTIBILITY OF IRRADIATED GRAPHITE DURING PULSE ANNEALING. J. D. McClelland. Dec. 18, 1952. Decl. Dec. 5, 1955. 11p. Contract AT-11-1-Gen-8. $0.15(OTS).

Pulse annealing studies are presented of the magnetic susceptibility of AGOT-KC graphite with irradiations of 12.5, 48, 146, 460 and 1534 Mwd/ct in the Hanford "B" test hole. The samples were pulsed stepwise in steps of approximately 100°C to a temperature of 2180°C where the samples showed complete recovery to their pre-irradiation value. The curves show two active annealing regions, the first between 100 and 500°C and the second between 1100 and 1500°C. The data are in good agreement with theory. (auth)

6437 NAA-SR-1287

North American Aviation, Inc., Downey, Calif.

PYROLYTIC AND RADIOLYTIC DECOMPOSITION RATE STUDIES ON ORTHO-, META-, AND PARA-TERPHENYLS. Eugene L. Colichman and Raymond Fish. May 15, 1955. Decl. Dec. 5, 1955. 22p. Contract AT-11-1-Gen-8. $0.20(OTS).

The pyrolytic and radiolytic decomposition rates of the terphenyls have been determined at 400°C and 450°C, employing 1-Mev electrons for the radiolyses. Para-terphenyl is apparently the most stable isomer. The rates of decomposition determined here are the lowest values reported in the literature for any compound under comparable conditions of temperature and radiation. The high pyrolytic and radiolytic stability obtained suggests possible high temperature application. Results presented here permit the appraisal of the terphenyls for anticipated use in nuclear reactors as coolants and/or moderators. (auth)

6438 ORNL-106

Oak Ridge National Lab., Tenn.

LEAD STORAGE BATTERY RADIATION DAMAGE TESTS. C. Clifford and T. Arnette. Nov. 16, 1948. Decl. Jan. 16, 1956. 34p. Contract W-7405-eng-26. $6.30(ph OTS); $3.00(mf OTS).

A lead–acid storage battery was placed at the inner edge of the X-10 shield in a neutron flux of 10^{10}(nv) and a gamma flux of 8 to 10,000 r/hr. After being left there for two weeks, the battery was taken out. Comparisons were made of operating characteristics before, during, and after exposure. No trends indicating radiation damage were apparent in the data obtained. Also, by means of an ion chamber and gold foils, γ and neutron fluxes were measured. These data indicate the battery to be a worse neutron shield than the same thickness of water. However, it is more efficient than water for γ radiation since the density is greater. (auth)

RADIOACTIVITY

6439 ANL-4332

Argonne National Lab., Lemont, Ill.

A "MOCK-UP" METHOD FOR STUDYING THE POSSIBLE MODES OF RADIOACTIVE CONTAMINATION. R. F. Plott. Aug. 15, 1949. Decl. Jan. 5, 1956. 5p. Contract W-31-109-eng-38. $1.80(ph OTS); $1.80(mf OTS).

The employment of certain fluorescent materials to indicate the modes of solid and liquid and perhaps gaseous contamination that may occur in working with "mock-up" radioactive materials or equipment is especially useful for

the proper training of people. The fluorescent material, like the radioactivity to be later encountered is not visually detectable without some aid. Thus, by the use of the fluorescent method, errors and other bad practices can be minimized in the "mock-up" work. In fact, a semi-quantitative or even a quantitative evaluation may be made of many of the radioactive hazards without the workmen ever having been exposed to radioactivity. (auth)

6440 CF-50-2-38
Oak Ridge National Lab., Tenn.
INDUCED ACTIVITY IN ALUMINUM TANK SECTION D. J. A. Lane. Feb. 10, 1950. Decl. Dec. 20, 1955. 4p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

6441 K-736
Carbide and Carbon Chemicals Co. K-25 Plant, Oak Ridge, Tenn.
THE ENERGY SPECTRUM OF LEAKAGE NEUTRONS FROM A HOMOGENEOUS REACTOR. R. C. Rohr and H. F. Henry. July 5, 1951. Decl. Dec. 27, 1955. 27p. Contract [W-7405-eng-26]. $0.25(OTS).

The leakage neutron spectrum from a chain reaction in an aqueous solution of uranyl nitrate was determined for the purpose of calibrating In foil to be used for personnel monitoring of a critical reaction. The over-all cross section of In for neutrons of all energies in this leakage spectrum was found to be of the same order of magnitude as the value which was determined from the calculated energy spectrum using weighted averages of directly measured cross sections. (C.H.)

6442 UCRL-840
California. Univ., Berkeley. Radiation Lab.
COUNTING EFFICIENCY OF Np^{239}. H. M. Neumann. Aug. 1, 1950. Decl. Dec. 8, 1955. 8p. Contract W-7405-eng-48. $0.15(OTS).

Counting efficiency of the radiations from Np^{239} was determined using the beta counters used in this laboratory. End-window Geiger tubes, 2 filled with argon-ethanol and 3 with argon-chlorine, found average values of 13.5 disintegrations/count and ~1.3 electrons/disintegration. These results are in agreement with other data. (F.S.)

SHIELDING

6443 AECD-3786
Hanford Works, Richland, Wash.
ATTENUATION OF GAMMA RADIATION BY HIGH DENSITY LEAD GLASS COMPARED WITH STEEL. R. G. Wheeler. Mar. 21, 1950. Decl. with deletions Dec. 2, 1955. 11p. Contract W-31-109-eng-52. $0.15(OTS).

Calculations, based on absorption coefficients obtained previously indicate that 80% PbO in glass should attenuate 1.5 to 2.5 Mev gamma radiations as effectively as steel. The comparison of steel with lead glass having a density of 6.17 g/cc showed that for practical purposes the shielding properties of the two materials are the same, when irradiated U and Al are used as the sources of radiation. The efficiency of light transmission of 6.17 density lead glass compared favorably with 4.6 density commercial fluoroscopic grade lead glass. (auth)

6444 AECD-3886
Hanford Works, Richland, Wash.
THE ENGINEERING PROPERTIES OF IRON–LIMONITE CONCRETE FOR CONSTRUCTION OF BIOLOGICAL SHIELDS. Curtis Warren. Jan. 30, 1952. Decl. with deletions Jan. 7, 1956. 9p. $1.80(ph OTS); $1.80(mf OTS).

6445 BNL-1357
Brookhaven National Lab., Upton, N. Y.
THEORY OF FLUX PERTURBATIONS BY VOIDS IN SHIELDS. Herbert J. Kouts. Sept. 15, 1952. Decl. Dec. 12, 1955. 20p. $0.20(OTS).

The one-velocity integral transport equation is derived from first principles assuming, at first, a source distribution and a convex scattering medium over which the cross sections are constant. This restricted scattering geometry is later modified to include the presence of shield voids. The one-group theory is then applied to spherical voids in water. The two-group calculations are developed more empirically on the assumption that in the absence of voids the flux can be divided into two-energy groups which are in equilibrium. One group consists of a relatively high-energy component with a strong forward angular distribution, and the second group consists of an isotropic secondary component which must be visualized as originating from multiple scattering of the primaries. (L.M.T.)

6446 CF-50-8-98
Oak Ridge National Lab., Tenn.
SHIELDING OF NUCLEAR REACTORS. LECTURE V. THE ECONOMICAL DISTRIBUTION OF GAMMA AND NEUTRON ATTENUATING MATERIAL IN A REACTOR SHIELD. E. P. Blizard. Aug. 25, 1950. Decl. Nov. 30, 1955. 8p. Contract [W-7405-eng-26]. $1.80(ph OTS); $1.80(mf OTS).

Expressions are derived to show the most advantageous pattern to be used in a reactor shield with reference to the materials available and the minimum weight. (B.J.H.)

Refer also to abstract 6349.

SPECTROSCOPY

6447 HW-31640
Hanford Atomic Products Operation, Richland, Wash.
THE ECHELLE SPECTROGRAPH AND HANFORD ANALYTICAL PROBLEMS. W. W. Marshall. July 14, 1954. Decl. Jan. 5, 1956. 13p. Contract [W-31-109-eng-52]. $3.30(ph OTS); $2.40(mf OTS).

URANIUM AND URANIUM COMPOUNDS

6448 AECD-4116
Tennessee Eastman Corp., Oak Ridge, Tenn.
CRYSTAL DENSITIES OF URANIUM CHLORIDES. C. C Sterett and V. P. Calkins. Dec. 13. 1946. Decl. Jan. 27, 1956. 6p. Contract W-7401-eng-23. (H-8-385-12). $1.80(ph OTS); $1.80(mf OTS).

Using xylene as the densimetric solvent, the crystal densities have been determined by the pycnometric method for the following chlorides, UCl_3, UCl_4, $UCl_6 \cdot UCl_4$, UCl_5 and UO_2Cl_2. (auth)

6449 ANL-5075
Argonne National Lab., Lemont, Ill.
ORIENTATIONS OF LARGE GRAINS PRODUCED BY STRAIN-ANNEAL TREATMENT OF HIGH PURITY URANIUM. E. S. Fisher. May 15, 1953. Decl. Dec. 10, 1955. 16p. Contract W-31-109-eng-38. $0.20(OTS).

The orientations of 16 large grains, which were produced in a rod of high purity uranium in an attempt to prepare a single crystal by the strain-anneal method, have been determined, using back-reflection Laue photograms obtained from the individual grains. The orientations are reported here relative to the rod axis and to a longitudinal plane of examination parallel to the rod axis. The large grains were formed by strain-annealing from a structure of fine grains produced by 575°C recrystallization after high reduction at 300°C. The results of this study show a

preferred orientation of (010) poles in the direction of the rod axis, and all but 3 of the grains have the (001) poles within a 90° range of rotation around the rod axis. (auth)

6450 CC-1607

Clinton Labs., Oak Ridge, Tenn.

PREPARATION OF U^{233}. R. S. Apple. May 18, 1944. Decl. Feb. 2, 1956. 21p. (A-2288). $4.80(ph OTS); $2.70 (mf OTS).

Procedures and equipment for the preparation of U^{233} on a semi-works scale are outlined. (B.J.H.)

6451 CT-2632

Battelle Memorial Inst., Columbus, Ohio.

PROGRESS REPORT ON METALLURGY OF TUBALLOY TO UNIVERSITY OF CHICAGO. Jan. 1, 1945. Decl. Dec. 14, 1955. 26p. Contract [W-7405-eng-92]. $4.80(ph OTS); $2.70(mf OTS).

Determinations were made of the thermal conductivity of Mo–U alloys, hydrogen solubility in Mo–U alloys, and the mechanical properties of Mo–U alloys. The annealing of Mo–U alloy is also discussed. Progress is reported on the development of Mo coatings. Studies were continued on the properties of U–Nb alloys and Th. (B.J.H.)

6452 MonP-48

[Clinton Labs., Oak Ridge, Tenn.]

CRITICAL EXPERIMENTS ON FLUORINATED AND HYDROGENATED MIXTURES CONTAINING ENRICHED URANIUM. Final Report—Problem Assignment PX14-1. A. H. Snell. Nov. 30, 1945. Decl. Jan. 11, 1956. Contains Supplement: CORRECTION FOR INHOMOGENEITY. E. Greuling. May 31, 1946. 29p. Contract W-35-058-eng-71. $6.30(ph OTS); $3.00(mf OTS).

Experiments are described on the critical sizes of assemblies of fluorinated, hydrogenous mixtures containing 24% enriched uranium. A hydrogenous reflector was used. The critical masses of the uranium as a function of the amount of hydrogen in the mixture under the experimental conditions of density and effective molecular weight are tabulated. The effect of Cd and B shielding between the U mixture and the surrounding reflector was also studied, and an experiment was made on varying the shape from a cubical to an elongated geometry. An attempt is made to interpret the criticality results in terms of pure UF_6, leading to the result that at this isotopic concentration, and a density of 4.5, about 36 kg of UF_6 would be critical if lumped surrounded closely by hydrogenous material. (auth)

6453 TID-5181

Massachusetts Inst. of Tech., Cambridge.

THE MELTING AND CASTING OF URANIUM FROM POWDER. John Chipman. June 1945. Decl. Jan. 13, 1956. 11p. $3.30(ph OTS); $2.40(mf OTS).

6454 TID-5208

Massachusetts Inst. of Tech., Cambridge.

THE PRODUCTION OF URANIUM POWDER COMPACTS. O. Cammann. June 1945. Decl. Jan. 12, 1956. 6p. $1.80 (ph OTS); $1.80(mf OTS).

The method of preparation of uranium pieces, 1 in. by 1 in. by 0.5 in., of high purity and with a density of about 16 g/cm^3 is described. They were made by pressing in hardened steel dies at 60 to 70 tsi. The pressed pieces were pyrophoric and had to be stored and shipped at "dry-ice" temperatures to prevent ignition. (auth)

Refer also to abstracts 6316 and 6318.